



Creative approach

Long telephotos

A long telephoto lens is an invaluable tool for creative photography, whether you want to create unusual juxtapositions, or simply to magnify a distant subject to make it larger in the final photograph



Vautier/de Nanve

Lenses of different focal lengths each bring their own visual characteristics to a photograph. Simply fitting a particular type of lens to your camera makes you think a certain way and look specifically for subjects which suit the equipment you have at hand. Telephoto lenses in particular have this effect—when you look at your surroundings through a telephoto, certain subjects present themselves more readily than others—a row of telegraph poles that can be compressed together, a patterned field that can be isolated from a wide vista or a solitary figure walking along an empty city street.

The characteristics of longer telephoto lenses—compressed perspective, shallow depth and a narrow field of view—become more distinctive with lenses longer than around 200 mm. Lenses of this group often allow you to create pictures out of the most inauspicious surroundings.

Most people fit a long telephoto lens for its most basic purpose—to magnify the subject so that it appears larger in the frame. As such it becomes a basic tool for candid, sports, wildlife and other subjects where the photographer's

Y. Goto/The Image Bank



Shower The selective view of a long telephoto was exploited here to isolate the figures standing behind the curtain of spray

Statue of Liberty Striking sunset pictures can be made with very long lenses but they look more striking still if a bold silhouette is included

access to the subject is limited. Many images fail to generate impact simply because the photographer has not managed to get close enough to the subject so that the main area of interest is not sufficiently detailed and so there is too much extraneous space around it. Long telephotos overcome this problem with ease—even in the most commonplace situations—perhaps filling the frame with the face of a stranger standing on the other side of the street. This facility makes you look for other subjects, rarely seen at close range—cloud formations, for instance, make interesting subjects when seen through a 200 or 300 mm lens.

One of the most obvious ways of using a telephoto for everyday subjects, instead of just for the applications often listed as suited to them, is to exploit the narrow

field of view to make highly selective compositions, picking out small details not readily apparent to the naked eye. By looking through a 300 mm lens, for instance, at a wide cityscape you can pick out unusual buildings and allow small sections of them to fill the frame. Try using the lens to compare old buildings with the new, or to create abstract compositions out of modern architectural designs. 500 mm mirror lenses are a particular favourite with some photographers, for with their narrow angle of

Giraffe café *The compression of these lenses can create juxtapositions and distorted comparisons of scale that are not apparent to the naked eye*

Spiral staircase *A long telephoto encourages the observation of small details and allows them to be made into strong graphic images*

Gianfranco Gorgoni/Colorific



John Sims



John de Visser

Anchor *Sometimes a detail is more striking than an overall view, but for close-ups of large subjects a long telephoto is essential*

Bjorn Borg *Lenses of this type are also indispensable for sport, allowing the photographer to fill the frame and eliminate distracting backgrounds*

view, flat perspective and almost total lack of depth of field, they can act almost like scissors—snipping out parts of the world around you. This can enable you to transform a scene into flat blocks of colour, tone and texture, isolating shapes and patterns and taking away any sense of form from three-dimensional objects.

In landscape photography the ability to be able to pick out details from a sweeping view is a valuable attribute. For this reason, many landscape photo-

Steve Parnell/Art-Sport



graphers are found more often with a 200 or 300 mm lens than with a wide angle. These telephotos can allow you to pick out particularly attractive features of the landscape—patterned fields, shapely trees or perhaps a distant farm building to give a sense of scale to a wider area. On a more practical note, long telephotos allow you to reach well beyond, for example, a boring foreground and to concentrate on the main area of interest.

Associated with this selectivity is a telephoto's ability to create striking juxtapositions. A small foreground object, for instance, can be made to appear the same size as a huge building in the background. Similarly, two totally incompatible subjects can be made to relate to one another in terms of spatial positioning. For instance, a yacht sailing on the lake in a city park can appear to be floating on the very doorsteps of skyscrapers up in the background.

This ability to juxtapose unusual subjects is also an ideal way of bringing colour to a fairly monochrome scene. With a 300 or 400 mm lens you might try

Mountain lion *The magnifying effect has an obvious application in wildlife photography where the subject is often some distance away*

Water skier *Getting close to the subject helps create impact but it is also essential to look for dynamic or interesting shapes in the frame*

Construction *Here the compressed perspective helped lead the eye to the construction worker and made the rods a feature rather than a distraction*

Bagged fish *A long lens is ideal for picking out and emphasizing a detail that might otherwise go unnoticed—like the bag in the boy's hand*

Stephen J. Kresmann/DRK Photo



Steve Powell/All-Sport



Vautier/De Narce



photographing a landscape or cityscape but shooting through a colourful row of flowers, defocused in the foreground. Alternatively, the foreground could be made a sharp and important element of a scene. An illuminated street lamp or traffic light could be composed against a background of an office building. If you choose your viewpoint with care and stop the lens down all the way, both elements will be sharp and the juxtapositions can be striking.

Another way long telephotos can be used creatively is to exploit the extremely shallow depth of field that these lenses have. By shooting at wide apertures, the background will be rendered an indistinct blur while the main subject is given prominence since it has been lifted away from its surroundings. This feature of long lenses is a great advantage with subjects like sport—for instance, a tennis player can be isolated from a distracting background.

Once you start experimenting with lenses of extremely long focal length—say an 800 mm or even 1000 mm or more—the creative possibilities are unlimited. Huge suns or moons can be composed in a frame or photographed in conjunction with an ordinary scene—perhaps using the extreme telephoto for one exposure and making a second exposure with a lens of more modest focal length (see page 513). The total lack of depth can also be used creatively for strong graphic designs carefully framed by scanning your surroundings through the viewfinder and picking out shapes that could otherwise pass unnoticed.

While exciting pictures can be made in this random approach—sweeping your surroundings and looking through the viewfinder at the shapes that appear—most strong telephoto images are created by the photographer's awareness of what makes a particularly good subject for the lens. For instance, the foreshortening effect can be exploited to emphasize the curves in a winding road while the tunnelling effect of an arched wooded gladed can be further exaggerated. Rows of cars held up in traffic, or of lamps lining a busy motorway are both similar subjects which can often be used to create dynamic images using a long telephoto.

Telephotos longer than 200 mm undeniably have great creative potential and can allow you to create exciting and unusual photographs—simply because they 'see' things in a totally different way to the human eye. However, in order not to be disappointed with the results, remember that using long lenses entails various technical problems, not the least of which is camera shake and mirror vibration. To get the most out of your long telephoto shots, you will need to get into the habit of using a tripod at all times and using your camera's mirror lock facility, where fitted. The unusual optical characteristics of these lenses will only have impact if your final prints or transparencies are perfectly sharp.

John Garrett



Equipment file

Movie versus video

Competition in the market place between video and movie equipment has never been greater, and it promises to become even keener. With many conflicting claims from both sides, how do you choose between them?

When portable video recorders and cameras first came on the market, people predicted the early demise of home movie equipment. Home movies have always had a rather small band of devotees, and the archetypal 8 mm movie camera user has a small child whose progress is lovingly filmed. The camera is brought out for weddings and holidays, and the results shown at special movie nights, with all the ceremony of setting up the projector and

screen, blacking out the room and rearranging the furniture in order to see films lasting a mere 210 seconds each.

Video, on the other hand, offers three hour tapes which you can view on your television set. No preparation is needed, since the video recorder is usually connected to the set for recording the TV output. And there is no need to send the tapes off for processing—you can view them straight away, and even reuse the tape to record fresh material, just as you

can any other recording tape.

But the decision to go in for video rather than film is not at all clear cut. There is much more to be considered, and there are many circumstances in which film is preferable. To find out why, one needs to look at the video equipment itself, and then compare its features with movie equipment.

The equipment needed for video recording is much more bulky than that for movie work. As well as the camera,

Video and movie compared
Choosing between the two systems can be difficult because there are good points as well as drawbacks with both. The image

quality of movie (inset below) is clearly superior, and a movie camera is much more portable—but video wins out for versatility and low running cost



there is a recorder containing a rechargeable battery pack, which is quite heavy. If you are running the camera from the mains electricity, you use an AC adapter and rectifier which converts AC into DC—instead of the battery pack.

Video cameras

The basic video camera is about the same size as a sound movie camera, though rather lighter. It is connected to the recorder or AC adapter by a heavy duty cable, usually some 3 m long. The lens is usually a zoom, with a fairly fast maximum aperture of $f/1.4$, and a zoom range of about six times minimum focal length, from wide angle to telephoto. The format is similar to 16 mm movies, so the actual focal lengths are about half those of 35 mm for a given effect. A maximum focal length of 70 mm, for example, gives the telephoto effect that one would expect from a 140 mm lens on 35 mm.

There is an iris diaphragm on the lens, but on some cameras adjusting it does not change the picture brightness. This is because the image brightness is controlled electronically, so if you stop



Dave King/equipment courtesy of Sony (UK) Ltd.

down the lens, the picture automatically remains at the same brightness. The iris simply allows you to control the depth of field. On other cameras, the iris diaphragm does control brightness automatically through a servo motor. You can observe the diaphragm in motion if you look through the front of the lens while the lighting is varied, for example, after covering and uncovering the lens quickly with a card or hand.

There is often a manual override on the automatic exposure control and this is a feature worth having as the electronic image can only cope with a limited brightness range. Very often a light sky or, when indoors, a window, will flood the exposure control and leave you with a well-exposed sky or window frame but darkness everywhere else. The exposure override allows you to compensate for such highlights, with its backlight control.

Most cameras have another control not found on movie cameras—for colour balance, sometimes called the 'white' control. This adjusts the output of the colours to allow for the colour temperature of the scene. On many cameras this is automatic, and carries out an 'integration to grey' as on a colour analyzer (see page 1552) to give an overall balance of colour. There is an override to allow you to correct for unusual subjects, and often a set of optical filters inside the camera to give the basic correction for different light sources. Some cameras do not have an auto white control, but instead have a

Typical features on a video camera include sensitivity, iris diaphragm and colour balance controls, a zoom lens operated manually or by motor drive and a built-in microphone. Some cameras incorporate a fader control which, when selected, causes the image to fade in or out gently instead of abruptly. An electronic viewfinder doubles as monitor, through which shots are composed, or viewed after recording. The scene is viewed in detail through an eye lens, which can be flipped out of view to reveal a ground glass viewing screen

small meter on the side of the camera whose needle shows the redness or blueness of the lighting. You must centralize the needle for correct colour.

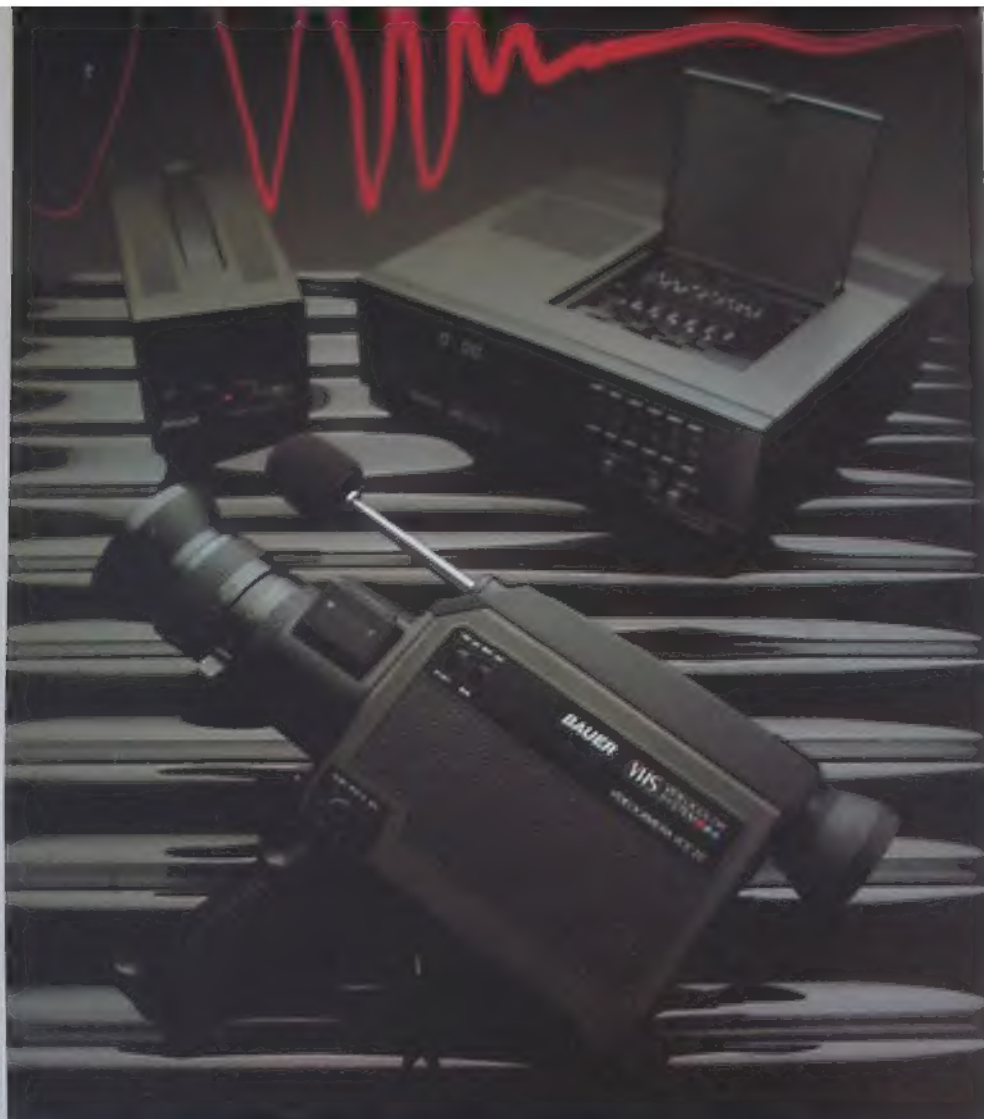
Control of colour balance seems to be more of a problem with electronic cameras than it does with film, and while it is easy to balance for tungsten lighting, any trace of daylight in the same scene will appear very blue, giving a weird cast to faces.

A sensitivity switch gives greater tube sensitivity in dim lighting, with slightly worse picture quality. If you are likely to do a large amount of available light work, it is worth comparing the tube sensitivities of the various models. These are given in terms of the dimmest illumination that give a picture, quoted in lux (see page 2346). A typical tungsten-lit



interior has a brightness of 50 to 75 lux, while a sensitive video camera at full aperture has a sensitivity of 30 lux.

Sound is picked up by a microphone on the camera. Unless this can be extended away from the camera on a short boom it may pick up the breathing of the camera user, so there is usually a jackplug which allows you to attach an external microphone, and a headphone socket so that you can monitor what is being recorded. The camera is completely silent in operation, so there is no need for a sound shield—though there may be an audible click as you begin the recording and noise from a motorized zoom may be picked up. Recording is done by setting the recorder to its record position, then controlling it by means of a pause button on the camera.



The viewfinder is usually a small black and white picture tube (a cathode ray tube or CRT) which shows exactly what is being picked up. Some models have indicators in the viewfinder to show when you are recording and when the scene is too dim for a good picture. A useful feature is a switch on the camera to allow you to use the CRT as a monitor

to view what you have already recorded—essential when you are on location.

The video recorder

A portable video recorder is usually much heavier and more bulky than an audio cassette recorder. It usually has a wide range of controls, such as are found on home recorders—fast run, freeze

frame and so on. The lightest currently available weighs around 3 kg, while the average is nearer 5 kg, including the battery pack, which weighs about 800 g.

The weight of the recorder depends very much on the tape format being used. There are an increasing number of formats on the home recording market. VHS and Betamax are the principal ones, though there are now systems which use non-standard formats. Technicolor cassettes are almost the same size as audio Compact Cassettes, though using 6.25 mm tape, while JVC are introducing a system called VHS-C. This uses the standard 12.7 mm VHS tape, but with a much smaller cassette. The tape lasts just 30 mins, and the cassette can be used in a conventional machine using an adapter which is the same size as a standard VHS cassette. The VHS-C recorder weighs just 2 kg without batteries.

Other manufacturers are developing formats which will combine the camera and the recorder, so that only a single unit will be needed. Meanwhile, the weight and bulk of recording units restricts their popularity.

All manufacturers offer a tuner unit, matching the recorder, which allows the recorder to be used for recording TV programmes like a home mains recorder. The tuners operate only off mains voltage, and usually function as an AC adapter for using the camera in the home, and as a battery charger. Home video recorders can also be used to record the signals from a video camera. Most have a socket which accepts the camera's video signal.

Picture quality

How does the picture from a portable video system compare with that from a Super-8 movie camera? In all respects, the movie film is superior—colour definition and brightness range are visibly better. The definition of a home video recorder is equivalent to a picture with



An AC adapter (left background, above) powers a video tuner (right background) and recorder, and recharges the video recorder's battery pack automatically

A complete video system (left) includes a recorder, camera, tuner and remote control. The tuner incorporates an AC mains adapter and battery charger

For outdoor filming, all that is needed is a portable recorder with a charged battery and a video camera. The recorded tape is played back through a TV set



only about 250 lines, though the picture actually has the usual 625 lines (525 in Canada). A Super-8 picture has better quality than even a 625-line studio camera.

Furthermore, the Super-8 picture can be shown on a large screen, while video is restricted to the size of the screen on your television set.

Portable video cameras give poorer

Cassettes A major difference between video systems is the cassette design. Each has its own way of loading the tape on to the recording head and keeping it tensioned and aligned



Battery packs vary in size and capacity with the make. Typically, charging time is an hour, and the charge lasts for about an hour. The pack is loaded into the portable recorder

recorder is connected to the home television set as a matter of course. Any sequence on the tape can be selected and shown in a matter of minutes, while a movie film requires a considerable amount of setting up. Film, of course, is not available for instant replay but must be processed after shooting.

Cost

For many people, cost is the deciding factor. Video equipment costs from two to three times as much as a sound movie camera and projector, but the cost of tape is lower than that of film—a three hour tape costs less than two 3½ minute sound movie films. There are numerous advanced mechanisms in a video recorder, however, so over a five year period the running costs of video could be high—video heads have a limited lifetime. Movie repair costs are likely to be lower, since the equipment is basically simpler. The question of cost therefore can only be decided on the basis of the use you are likely to get from the system.

Which should you choose?

There are pros and cons for each system. Video is fine for anyone with a keen interest in making documentaries, or who wants to record family life in detail. Super-8 is better for both the occasional family film, and for the dedicated film maker who wants high quality results which can be edited. Anyone who travels widely will find Super-8 more convenient, since the camera is light, and film is available everywhere in the world. As a medium, it has many advantages over video. The question is, which drawbacks, those of film or video, do you prefer to put up with?

quality than studio cameras, and even the expensive professional cameras cannot match studio camera quality. Such cameras are sometimes called *ENG* cameras, from their use for Electronic News Gathering for television news bulletins.

The lifetime of videotape is limited. After a few plays, the picture may be affected by *dropouts*—white specks on the image caused by wear of the magnetic coating. Tapes can be accidentally erased, either by recording over them or by leaving them close to a magnet, such as found in loudspeakers.

Film, on the other hand, can last tens of years, though unless properly stored it can become brittle. But Kodachrome films made 30 years ago retain their colour and sparkle, though the more they are shown, the greater the risk of scratches.

Editing and copying

Film can be edited easily (see page 1774), but it is not possible to cut and edit videotape in the same way. The only practical means of editing is to link your recorder with another, using the video input and output sockets of each, and copy the sequences you want in the correct order. Quality suffers when a copy is made, and sometimes tapes made

on one make of machine will not play well on another make of machine of the same format. The result, however, is still quite viewable.

While this technique requires you to acquire or borrow another machine, it does make copying of your recordings very much cheaper and simpler than copying an 8 mm film, which has to be carried out by a professional transfer studio at no small cost.

Convenience

A video system is inevitably much more bulky to carry around than a movie camera. Some video cameras are designed to be used mounted on the operator's shoulder, while there are various devices, such as backpacks, to help carry the load of the video recorder. A movie camera, on the other hand, can be hand held and is easily carried around in luggage.

The full size video cassettes are bulky compared with Super-8 cartridges, but hold enough tape for several hours' recording, compared with just 3½ minutes for Super-8. A fully charged set of batteries lasts for an hour, and recharging takes about an hour.

While video is inconvenient during location recording, playback is easier than with a movie film, assuming that the

EXPOSURE

Getting the correct exposure on your negative and slides means much more than simply measuring the light. But everyone takes it for granted—until something goes wrong



Jason Rhoads

In practice, the biggest single technical problem facing the photographer is that of achieving correct exposure. After a little experience, and with the help of modern metering systems, most photographers manage to get the majority of exposures right, without ever really knowing why. Yet to find out the best exposure for each and every subject and keep under- and over-exposure to a minimum, it is important to understand just what does make a correct exposure.

In the early days of photography, exposure was very much a hit and miss affair and photographers achieved their results largely through trial and error. However, two amateur photographers who were scientists, F. Hurter and V. C. Drifffield, found this approach to exposure unsatisfactory and, in 1876, began a long series of scientific tests to establish precisely how emulsions did respond to given quantity of light. Their experiments consisted essentially of administering measured

doses of light—with the aid of the rotating wheel from an adapted sewing machine—to an emulsion and measuring the density of the result. When they published their results in a paper entitled *Photochemical Investigations and a New Method of Determination of the Sensitiveness of Photographic Plates* in 1890, they referred to their equipment as a *sensitometer*. The term *sensitometry* has since been widely adopted to describe this kind of work.

Sensitometry is the scientific study of the sensitivity of photographic emulsions. It is basically concerned with the overall *performance* of the emulsion—that is, the amount of light needed to produce a certain *blackness* or density in the negative. Many sensitometric standards have been set up over the years, such as the American Standards Association (ASA) and the German DIN systems, but all sensitometric tests work on the same principle. First of all, the photographic material under test is given a series of standard exposures in the

Which exposure? These two shots had identical lighting and exposure, yet the right hand one looks darker because of the angle of the lighting

sensitometer, whether this is a simple step wedge or a rotating wheel. The film or print is then processed in controlled conditions. Finally, the resulting densities of silver are measured with a densitometer. The densities can then be plotted against the exposure on a characteristic curve for the emulsion (see page 1518).

With the aid of the sensitometric information provided by the characteristic curve, it is possible to predict the precise effect of a given exposure. Every exposure value produces a certain film density. From this it might seem that we can decide what exposure is needed to give a certain film density (and so the 'correct' exposure) simply by referring to the characteristic curve for the film in use. In practice, it is not as simple as this. First, because exposure is partly a matter of personal prefer-

ence, second, because every picture contains a whole range of exposures.

What is exposure?

The word *exposure* has come to have a number of meanings in photography from the aperture-shutter speed combination to just the act of taking a picture. But in sensitometry, it has a very precise meaning. For any negative, exposure is essentially the amount of light that falls on the film. This depends upon two factors: the intensity of the light and the time it has to act up on the film.

For sensitometric calculations, the exposure is given by the equation

$$E = I \times t$$

where *E* is the exposure, *I* is the illumination (the intensity of the light) and *t* is the time. Illumination is measured in *lux* (lumens/square metre) and the time in seconds. So exposure is therefore given in *lux seconds*. It is the log of this figure (log *E*) which is plotted for the characteristic curve.

In practice, the photographer can control the total illumination through the use of the aperture setting, and the exposure time with the aid of the shutter speed. However, the illumination varies over the frame because various parts of the subject reflect different amounts of light—this is, of course, the basis of the photographic image. So exposure varies over the frame area with subject brightness. This means there is not one single 'correct exposure' for every negative: each negative receives a whole range of exposures. And for any given negative there is not just one log *E* value to be identified on the characteristic curve but a whole range.

With an 'overexposed' negative, the amount of light received from every part of the subject is large and so all the exposure values for the negative lie at the top end of the characteristic curve. This means that all the image is very dense. With an 'underexposed' negative, the amount of light received is small and exposure values are all at the lower end of the curve. The resulting negative is very thin. In both cases, density range is limited and

which all the subject brightness lies on the straight line portion. However, for most practice has shown best exposure places brightness range lower than this so that some values

brightness and an even distribution over the entire brightness range.

To peg an exposure at the right place on the curve, one solution would be to measure the darkest and lightest

take a reading of the total amount of light falling on the subject and are calibrated to give a corresponding exposure. This is far from ideal because it is not the total amount of light falling

Placing the exposure

ough some subjects have a very wide range of brightness, so wide that they cannot be accommodated by the film.

When the exposure is placed on the straight line portion of the characteristic curve, the exposure is said to be 'correct'. If the exposure is placed on the shoulder of the curve, the exposure is said to be 'overexposed'. If the exposure is placed on the toe of the curve, the exposure is said to be 'underexposed'. Once the exposure is placed, the exposure falls outside this range it will be overexposed.

very, very negative. The camera will be able to take a wide range of exposure but it will not necessarily be the best. Looking at the characteristic curve you might imagine that the best camera exposure is one in

exposure is

For instance

the exposure is placed on the straight line portion of the characteristic curve. The exposure is said to be 'correct'. If the exposure is placed on the shoulder of the curve, the exposure is said to be 'overexposed'. If the exposure is placed on the toe of the curve, the exposure is said to be 'underexposed'. Once the exposure is placed, the exposure falls outside this range it will be overexposed.

Determining exposure

Exposure is determined by the amount of light falling on the subject. The exposure is said to be 'correct' if the exposure is placed on the straight line portion of the characteristic curve. Unfortunately, they only work well for an 'average' subject—that is, one in which has a 'typical' maximum and minimum

the exposure is placed on the straight line portion of the characteristic curve. The exposure is said to be 'correct'. If the exposure is placed on the shoulder of the curve, the exposure is said to be 'overexposed'. If the exposure is placed on the toe of the curve, the exposure is said to be 'underexposed'. Once the exposure is placed, the exposure falls outside this range it will be overexposed.

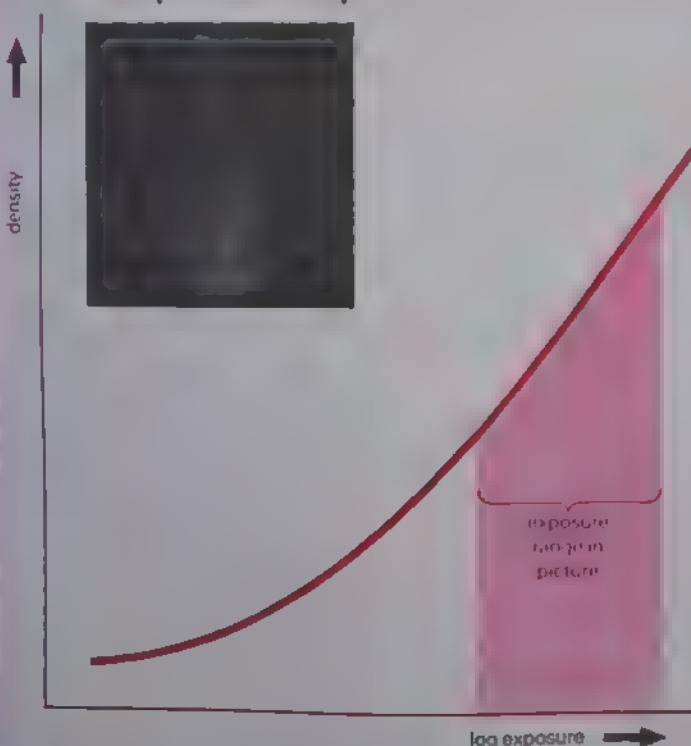
At the moment of exposure, the exposure is said to be 'correct' if the exposure is placed on the straight line portion of the characteristic curve. Unfortunately, they only work well for an 'average' subject—that is, one in which has a 'typical' maximum and minimum

Most light meters, including TTL meters, however, work on the *integrated* method. This means that they

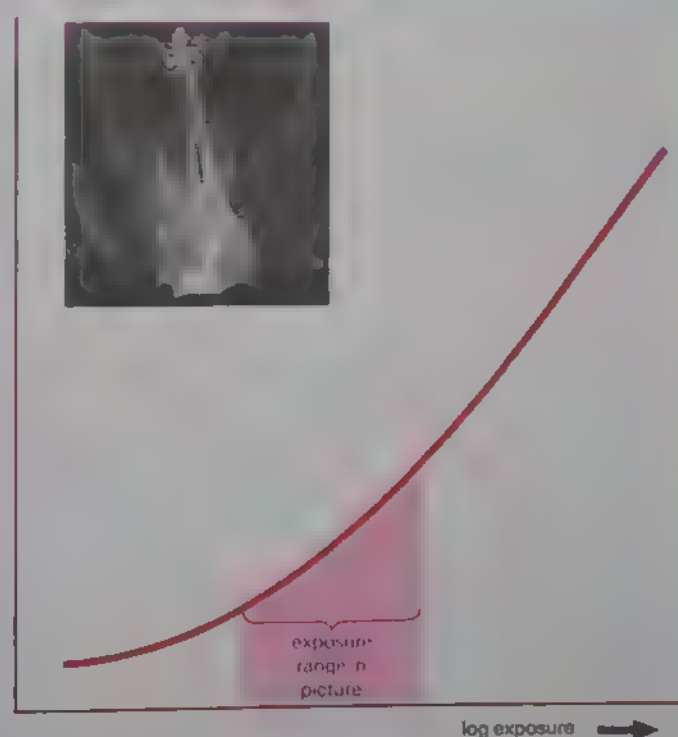
the exposure is placed on the straight line portion of the characteristic curve. The exposure is said to be 'correct'. If the exposure is placed on the shoulder of the curve, the exposure is said to be 'overexposed'. If the exposure is placed on the toe of the curve, the exposure is said to be 'underexposed'. Once the exposure is placed, the exposure falls outside this range it will be overexposed.

Finally, there is the *incident light* method in which the amount of light falling on the subject is measured, rather than that reflected. Although it sounds like an accurate method of determining the amount of light around, it is not a perfect guide to exposure. An incident light reading only gives the maximum brightness and ignores the shadows. So no method is foolproof.

Where to place the exposure



Dense neg This negative is exposed so that its tonal range falls on the straight line part of the characteristic curve—yet the prints are not ideal as graininess increases with density

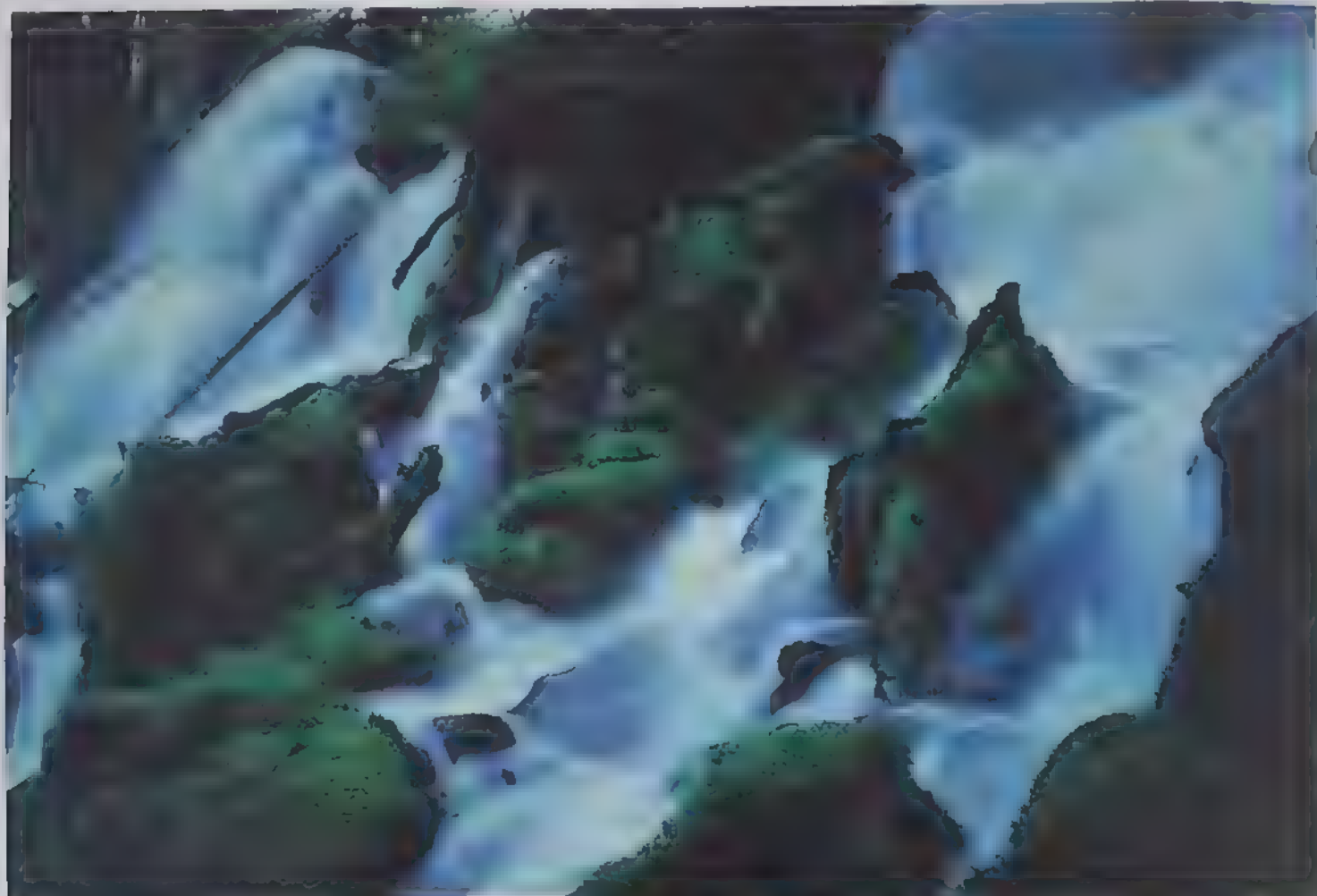


Lighter neg With less exposure, all essential details remain on the curve, yet the resulting print will have finer grain. Giving less exposure allows you to stop the lens down further

World of photography

David Muench

Through his large format photography of America's most outstanding areas of natural beauty, David Muench has revealed a seldom seen range and variety of landscape in all weathers and seasons



David Muench: *High ridge, New Mexico*

In the landscape world, David Muench is perhaps the most famous photographer working today. He has been called "the most important landscape photographer of our time" by *Time* magazine. He has been called "the most important landscape photographer of our time" by *Time* magazine. He has been called "the most important landscape photographer of our time" by *Time* magazine.

He has been called "the most important landscape photographer of our time" by *Time* magazine. He has been called "the most important landscape photographer of our time" by *Time* magazine. He has been called "the most important landscape photographer of our time" by *Time* magazine.

Muench is now world famous for his superb landscapes. They have appeared in an enormous number of books, including 12 that are solely illustrated by his own photography. Besides having a thriving market among publishers and private buyers of pho-

to, he has been called "the most important landscape photographer of our time" by *Time* magazine.

He has been called "the most important landscape photographer of our time" by *Time* magazine. He has been called "the most important landscape photographer of our time" by *Time* magazine. He has been called "the most important landscape photographer of our time" by *Time* magazine.

He has been called "the most important landscape photographer of our time" by *Time* magazine. He has been called "the most important landscape photographer of our time" by *Time* magazine. He has been called "the most important landscape photographer of our time" by *Time* magazine.

He has been called "the most important landscape photographer of our time" by *Time* magazine. He has been called "the most important landscape photographer of our time" by *Time* magazine. He has been called "the most important landscape photographer of our time" by *Time* magazine.

Cascade Falls, Umpqua River, Oregon

He has been called "the most important landscape photographer of our time" by *Time* magazine. He has been called "the most important landscape photographer of our time" by *Time* magazine. He has been called "the most important landscape photographer of our time" by *Time* magazine.

He has been called "the most important landscape photographer of our time" by *Time* magazine. He has been called "the most important landscape photographer of our time" by *Time* magazine. He has been called "the most important landscape photographer of our time" by *Time* magazine.

Upper Navajo Canyon, Arizona



Elioha River, Olympic National Park
Washington

neolhist. He is fascinated by the beauty of desert. His feelings are more in line with the

[illegible]Snake River Overlook, Grand Tetons
National Park, Wyoming

Day 1 Monday The Village Book



at the right time
are event It is a field of photography
benefits from

Snowdrifts banked up at the town of Chino.



Live oak and pool at the Aransas Wildlife Refuge near Corpus Christi Texas

1. Учебно-методическое пособие А.В.Степанова
 2. Учебно-методическое пособие А.В.Степанова
 3. Учебно-методическое пособие А.В.Степанова
 4. Учебно-методическое пособие А.В.Степанова
 5. Учебно-методическое пособие А.В.Степанова
 6. Учебно-методическое пособие А.В.Степанова
 7. Учебно-методическое пособие А.В.Степанова
 8. Учебно-методическое пособие А.В.Степанова
 9. Учебно-методическое пособие А.В.Степанова
 10. Учебно-методическое пособие А.В.Степанова

M. J. ...
...
...
...
...
...
...
...
...
...

[illegible]

graphs may be used to illustrate the following:



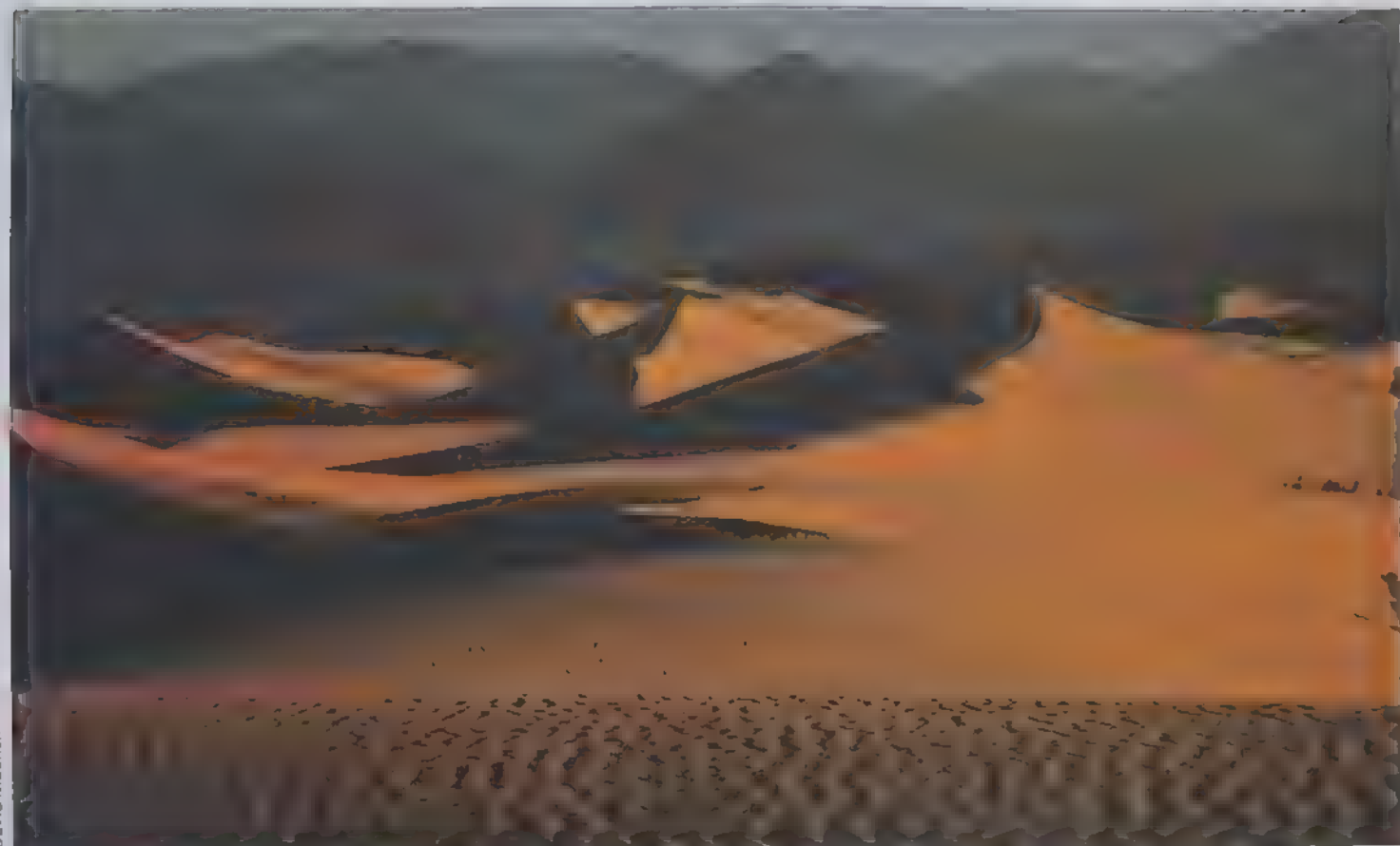


camera is much too fast a although he can sometimes lack of speed. Like any other professional photographer, Muench likes to bracket his film whenever possible in pursuit of the perfect exposure and also to take both verticals and

different seasons

Another satisfying project is retracing and

places be 10

[illegible]

David Muench

Dunes, Death Valley, California

he uses Tri-X film, a 1600 speed film, and Kodak Dektol and prints on a 100 lb. weight Seagull paper. As for the lenses, he uses Panatomic X, the smallest and sharpest lens made in 4 x 5 format. As for the photographing he does, he says that it is a great adjustment for him to go from black and white to colour. He says that he likes them to have some of the same look. He takes the attitude that he is not doing black and white pictures on colour film.

Most of Muench's projects in the past have involved spending a few months in one particular area, but for the book *Colorado* his brief was to show the state at all seasons. He considers it one of his most satisfying projects and spent the best part of a year

[illegible]

A letter from the author dated 1908
in reply to Mr. J. H. Mott's letter of 1907
dated 1908. He says he has no more to say
on the subject of the "H. J. Mott" case.

[illegible][illegible]

Pictures from an exhibition

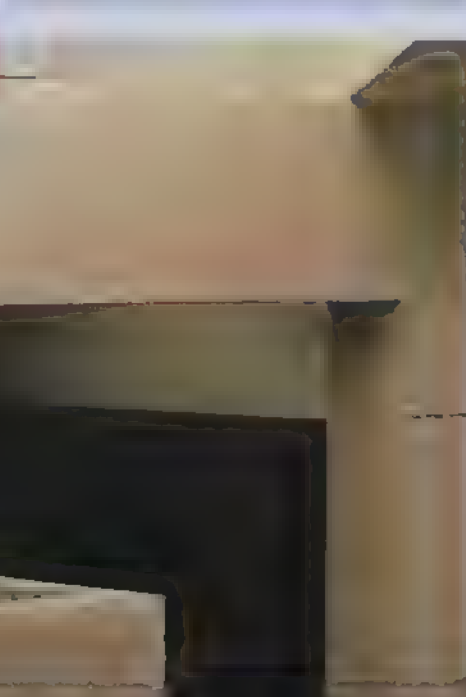


Sergio Dorantes

Most people visit a museum of modern art simply to view the exhibits, but Sergio Dorantes shows that such a place can also make an interesting location for photography

Most people visit a museum of modern art simply to view the exhibits, but Sergio Dorantes shows that such a place can also make an interesting location for photography

Most people visit a museum of modern art simply to view the exhibits, but Sergio Dorantes shows that such a place can also make an interesting location for photography



Most people visit a museum of modern art simply to view the exhibits, but Sergio Dorantes shows that such a place can also make an interesting location for photography



Sculpture silhouette To relate the sculpture to the modern building Sergio used a 20 mm lens, allowing this graphic silhouette to dominate the frame. **Red metalwork** Late afternoon sunlight and slight underexposure achieved maximum impact from the bright red finish. **Concrete beams** In this shot Sergio wanted to show how the modern architectural design harmonizes with the art collection housed inside. **Painting and disc** In order to combine the effect of these two exhibits, Sergio tried two different lenses. He began with the 135 mm but then decided that the shallow depth of his 500 mm lens was more effective—it pulled the two subjects together and enhanced their abstract nature. **Spectators** It is often worth studying the reactions of visitors to a modern art exhibition. **Yellow door** Sergio felt that the warm tungsten light suited this surreal scene. Kodachrome 64 was used for all these shots.



Improve your technique

Large format technique-1

Large format cameras give superb quality images. But using them can be difficult and confusing unless you know exactly what you are doing. However, things can be made much easier if you stick to a few standard procedures

Large format cameras are a great way to improve your photography. They give you a much larger image than most other cameras, and they can be used in a variety of ways. However, using them can be difficult and confusing unless you know exactly what you are doing. However, things can be made much easier if you stick to a few standard procedures.

Large format cameras are a great way to improve your photography. They give you a much larger image than most other cameras, and they can be used in a variety of ways. However, using them can be difficult and confusing unless you know exactly what you are doing. However, things can be made much easier if you stick to a few standard procedures.

The right equipment

When you are using a large format camera, it is important to have the right equipment. This includes a tripod, a remote shutter release, and a good lens. It also includes a good understanding of the camera's controls and a good understanding of the principles of photography.



David Farman

Large format cameras are a great way to improve your photography. They give you a much larger image than most other cameras, and they can be used in a variety of ways. However, using them can be difficult and confusing unless you know exactly what you are doing. However, things can be made much easier if you stick to a few standard procedures.

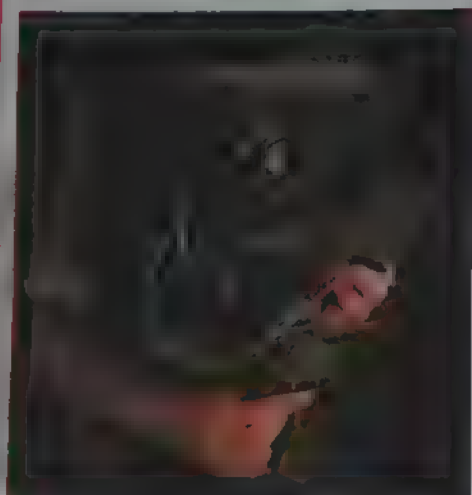
Large format cameras are a great way to improve your photography. They give you a much larger image than most other cameras, and they can be used in a variety of ways. However, using them can be difficult and confusing unless you know exactly what you are doing. However, things can be made much easier if you stick to a few standard procedures.

Large format cameras are a great way to improve your photography. They give you a much larger image than most other cameras, and they can be used in a variety of ways. However, using them can be difficult and confusing unless you know exactly what you are doing. However, things can be made much easier if you stick to a few standard procedures.

Large format cameras are a great way to improve your photography. They give you a much larger image than most other cameras, and they can be used in a variety of ways. However, using them can be difficult and confusing unless you know exactly what you are doing. However, things can be made much easier if you stick to a few standard procedures.

Sharp and sensual The main advantages of large format pictures are very fine detail and a good range of rich tones

Focusing and shooting



1 With the lens fully open—using the interrupt or 'T'—focus the image on the screen. A darkcloth is useful here



2 After stopping down, check the focus and depth of field with a magnifier. You can then close the lens and cock the shutter



3 Carefully insert the darkslide and remove the sheath. You can partly re-insert the darkslide or leave it out completely

the aperture is set, and the lens is stopped down. When the lens is stopped down, the camera will take a picture. The camera will take a picture when the lens is stopped down.

A darkcloth is useful here. After stopping down, check the focus and depth of field with a magnifier. You can then close the lens and cock the shutter. Carefully insert the darkslide and remove the sheath. You can partly re-insert the darkslide or leave it out completely.

When you are ready to shoot, the camera will take a picture. The camera will take a picture when the lens is stopped down.

As each film holder only holds two pieces of film, you obviously carry the same number of exposures as you can for, say, 35 mm. Ten darkslides are about the most you would want to carry. Apart from exercising some self-

discipline, there is nothing more to it. The camera will take a picture when the lens is stopped down.

When you are ready to shoot, the camera will take a picture. The camera will take a picture when the lens is stopped down.

Using the camera. Before you start, make sure the camera is set up correctly. The camera will take a picture when the lens is stopped down.

Using the camera

Before you start, make sure the camera is set up correctly. The camera will take a picture when the lens is stopped down.

When you are ready to shoot, the camera will take a picture. The camera will take a picture when the lens is stopped down.

When you are ready to shoot, the camera will take a picture. The camera will take a picture when the lens is stopped down.

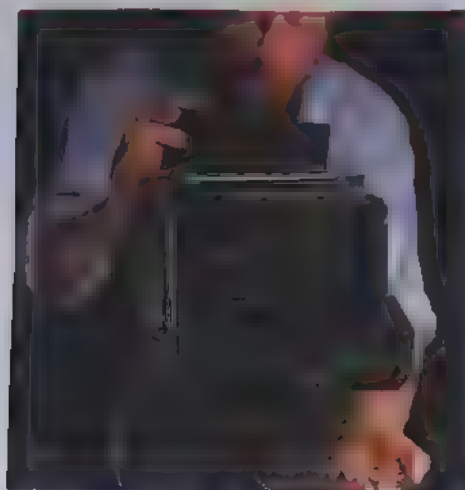
When you are ready to shoot, the camera will take a picture. The camera will take a picture when the lens is stopped down.

When you are ready to shoot, the camera will take a picture. The camera will take a picture when the lens is stopped down.

When you are ready to shoot, the camera will take a picture. The camera will take a picture when the lens is stopped down.

When you are ready to shoot, the camera will take a picture. The camera will take a picture when the lens is stopped down.

When you are ready to shoot, the camera will take a picture. The camera will take a picture when the lens is stopped down.



4 When you are sure everything is set correctly, fire the shutter, using a cable release to avoid joggling the lens



5 Fully replace the sheath (light side out) and remove the darkslide. Open the shutter stop the lens down, and check focus

you would not want to use a cable release to fire the shutter. The fact that each shot may require

you to stop the lens down and check focus is a disadvantage of this system. However, the fact that you can use a cable release to fire the shutter is a major advantage.

the camera. The fact that you can use a cable release to fire the shutter is a major advantage.

Digital click This is a very advanced (and expensive) unit which greatly simplifies exposure reading and shooting. It includes an electronic shutter, digital meter and a meter probe which reads off the film plane



Platinum printing

Platinum printing involves coating your own paper with an emulsion derived from one of the Earth's most prized metals—so it is certainly not cheap. But for image quality and permanence it is quite unmatched

Platinum printing is an attractive way to produce your own prints. In the process, you coat your own paper with an emulsion of metallic platinum particles. The result is a print of exceptional quality and permanence.

The process is simple, but it is not cheap. Platinum is one of the most expensive metals in the world, and the process of creating the emulsion is labor-intensive. However, the results are worth the effort.

Platinum prints are known for their exceptional detail and tonal range. They are also extremely durable, with some prints lasting for centuries. This makes them a popular choice for fine art prints.

The process of creating a platinum print involves several steps. First, you need to create an emulsion of platinum particles. This is done by dissolving platinum in a solution of potassium dichromate and then adding a reducing agent. The resulting emulsion is then coated onto a piece of paper. After the paper is dried, it is exposed to light and developed in a solution of potassium cyanide.

The paper base

Top quality acid free paper is essential for platinum printing. The paper should be clean, white, and free of any impurities. It should also be of a weight that allows the emulsion to be applied evenly. The paper should be stored in a cool, dry place until it is ready to be used.

Preparing the emulsion

The emulsion is prepared by dissolving platinum in a solution of potassium dichromate. The resulting solution is then added to a reducing agent, which causes the platinum to precipitate out of the solution. The resulting emulsion is then filtered and stored in a dark container until it is ready to be used.

Lincoln Cathedral Although it is quite impossible to do justice to the quality of the image of a platinum print on the printed page, this colour copy from an original does convey some of the beauty of this ancient process



Frederick H. Evans/T. Herbert Jones Collection

Coating and exposing a platinum print

What you need The chemicals and utensils needed for coating paper with the platinum emulsion. Clean working conditions are essential if you are to avoid waste of the very expensive ingredients

in one of two ways to form the platinum emulsion. Distilled water is used throughout. Mixing and coating are carried out at room temperature in an amber or red safelight.

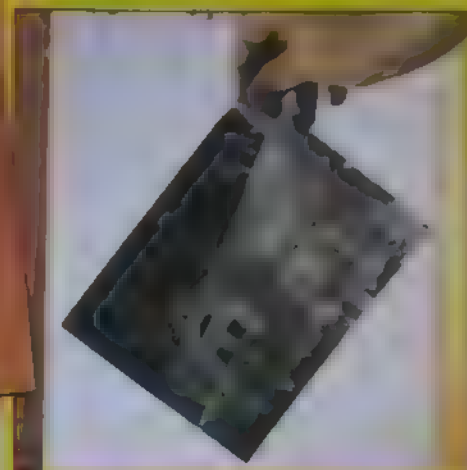
The first stock solution, solution A, is mixed in the proportion of 1 g potassium oxalate to 14 ml distilled water. Solution B is a mixture in the proportion of 1 g tartaric acid also to 14 ml distilled water. Solution C consists of 5.2 g potassium platinate dissolved in 28 ml distilled water. Solution C—which you may not need—is obtained by dissolving 1 g potassium chlorate in 28 ml of solution A. The chemicals will dissolve more easily if warmed distilled water is used, but let the solutions cool down before using them. The prepared solutions are light sensitive and must be kept in suitable containers, such as dark glass bottles.

You can choose from two mixes when you come to prepare the platinum emulsion. In the first 85 ml of solution A and 14 ml distilled water and 77 ml of solution B are combined.

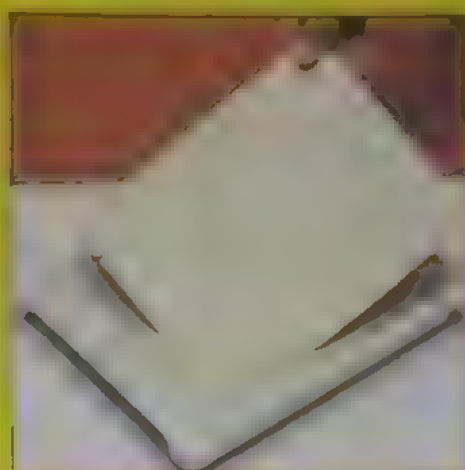
The second formula is exactly the same but with the addition of 14 ml of solution C. This second emulsion formula gives higher contrast results than the first.

But by varying the proportion of two of the three solutions used in a three-part mix, other levels of contrast can be obtained. Providing the platinum part—solution B—always forms more than half of the total amount of emulsion mix (say 55 per cent), solutions A and C can be mixed in varying proportions to make up the remaining quantity. The highest contrast is obtained when solution C predominates over solution A.

Start by using the basic formula, and prepare enough for your immediate needs from the stock solutions. This has to be established by experience but reckon on using one litre of emulsion solution to cover three A4 sized sheets with two coatings.



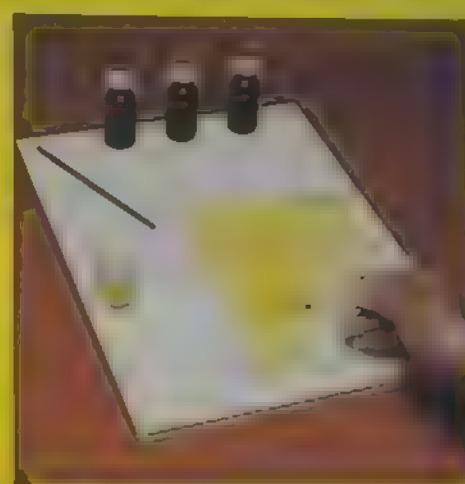
1 Contact printing methods are used in platinum printing, so the first step is to make a really good quality negative of the appropriate size



2 Choose suitable paper and presoak this for about ten minutes in a dish of distilled water. Notch the paper to identify the emulsion side



3 Do the coating on a fairly large sheet of thick glass or, as here, on a piece of plastic-faced board. This must be thoroughly cleaned before use



4 Place the paper on the work board and lightly blot the emulsion side of the paper. Then coat it with the prepared emulsion, using disposable buckle brushes

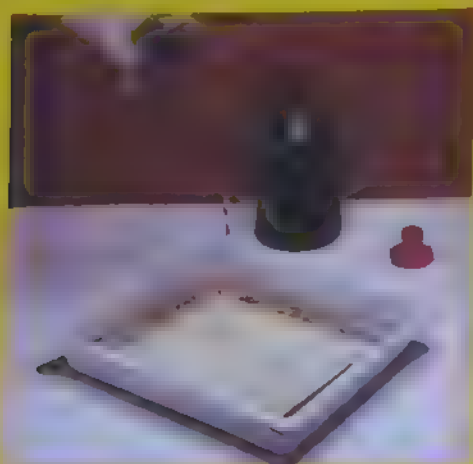


5 Allow the coated paper to dry in the dark. If necessary, you can accelerate drying with a hairdryer. A second coating can then be given, if required



6 Place the negative and paper emulsions together in a suitable contact printer and make the exposure—in strong UV light for between 2½ and 4 minutes—following tests

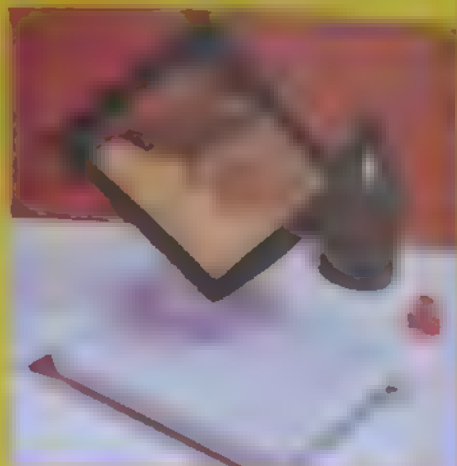
Processing a platinum print



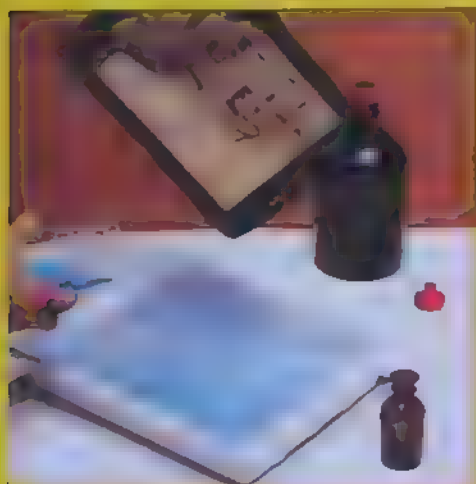
1 Place the exposed sheet of paper in a dish and pour the developer over it from above. Development should take place under red or amber safelighting.



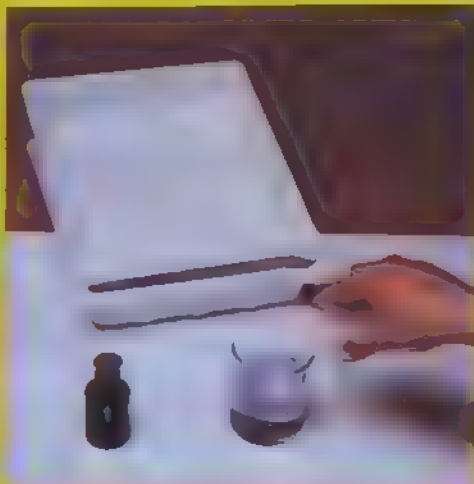
2 Rock the dish during the course of the two minute development period. The image will come up almost immediately but wait for the full development time to elapse.



3 At the end of the development time, carefully drain the print and immerse it in the clearing bath. The print assumes much of its final appearance.



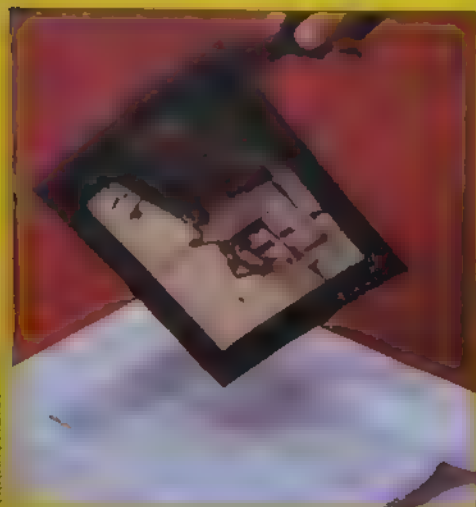
4 If contrast needs boosting, add some copper sulphate solution to the developing agent. You can get a warmer image by increasing developer temperature.



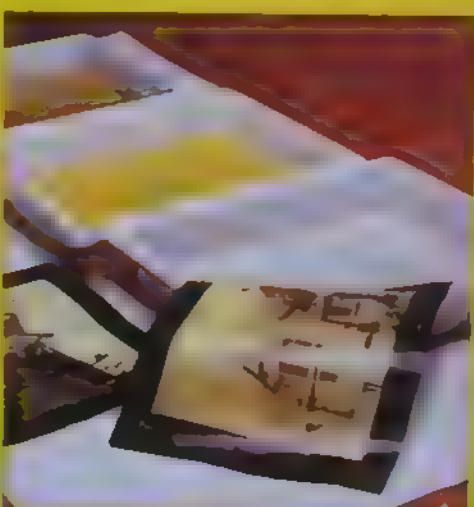
5 The clearing of the print—similar to fixing in conventional printing—is done in three separate baths consisting of a 2% solution of hydrochloric acid.



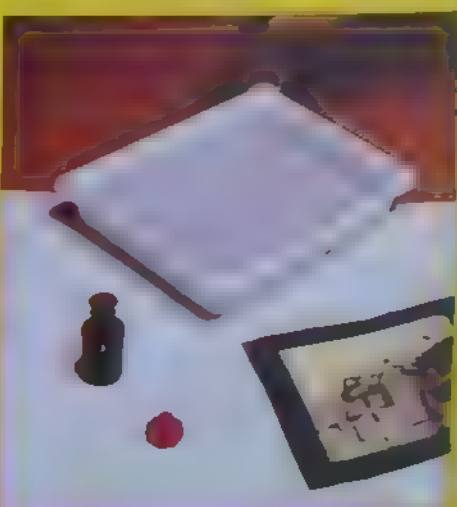
6 Immerse the drained print in the first of the three baths and leave it in this bath for five minutes, agitating from time to time. Then pass it into the second bath.



7 Leave the print in the second bath, again for five minutes before transferring it to the third for the same period. Note that the solution is clear at this point.



8 Exhausted clearing baths cause a yellow stain—notice here, the colour of a poorly cleared print (frontmost) and the colour of the clearing baths used.



9 Four final wash baths are needed, using distilled water to which a little acetic acid has been added. Tapwater can be used for the second and subsequent baths.



Group portrait Three eminent photographers—(from left to right) Bill Brandt, Ansel Adams, and Paul Joyce—recorded on a platinum print. Long life is one of the characteristics of a platinum print, so the process is ideal where a permanent record is required.

Lacock Abbey A modern photo can be given an old-fashioned look simply by using old-fashioned techniques. Any form of architectural work responds well to platinum printing because of the comparatively large range of tones that can be reproduced.

Coating the paper

Pre-soak your paper for 10–15 minutes in distilled water. Then mix 100 ml (3.5 fl oz) of 1% potassium dichromate solution with 100 ml (3.5 fl oz) of 1% gelatin solution. Dip the paper into the mixture, then into distilled water.

The appropriate amount of silver coating will be determined by the type of cotton wool used. The standard paper is 100% cotton. The paper is then dried in a dark room. Apply the negative to the coated paper, then expose it to light. The paper is then dried in a dark room. The paper is then dried in a dark room. The paper is then dried in a dark room.

You can prepare several sheets in advance and store them in a dark room. The paper should be exposed and developed as soon as possible after coating to avoid any sensitivity drop. This gives greater contrast and density.

You can prepare several sheets in advance and store them in a dark room. The paper should be exposed and developed as soon as possible after coating to avoid any sensitivity drop.

Exposure and development

Prints are made by contact printing the negative and exposing the sandwich to light strong in ultraviolet, such as bright sunlight. However, you may find it better to use a more predictable light source such as a UV or QI lamp held about one





Paul Joyce/Contrasts Gallery

Landscape One of the most prized characteristics of platinum printing is the immensely wide tone range it can handle. This enables you to reproduce fine highlight detail as well as the subtle nuances of shadow regions

metre above your printing frame

Exposure times will vary according to the negative, the nature of the exposing light and the characteristics of the coated paper. Therefore make a series of test exposures at 4, 6 and 12 minutes to begin with. Eight minutes is a typical printing exposure time in bright sunlight. Make a note of the emission formula and the corresponding exposure times for future reference. A low contrast emulsion for instance will print more quickly than a high contrast emulsion and it may seem curious not to print the same negative next time using a different formula. Unlike bar printing there will not be an easily visible image so you must wait until the print is developed and dried before assessing the exposure.

Development should be done using solution at room temperature under amber or red safelighting. It is important to use perfectly clean, ideally new plastic dishes because these will be uncontaminated. Keep these exclusively for use in platinum printing.

Prepare the developer by dissolving 500 g potassium oxalate in 1.5 litres of distilled water. This is a saturated solution which is reusable and which can be kept indefinitely.

Lay the exposed print on the bottom of the tray and pour the developer solution over it until it is well covered. Rock the dish for two minutes. Although the image

may come up almost immediately you should give the developer time and effort to penetrate the depths of the paper before placing it in the clearing bath which follows. This speed of the clearing bath tends to bleach some of the detail and although the effect is subtle it can take out delicate highlights, leaving an underdeveloped print. This is the possible way of reducing the contrast in fact and a similar effect can be produced by underexposing the print and then using a warmed up developer solution.

Using developer at a higher temperature also makes the image warmer toned. A more controllable way to do this is to add to the developer a few drops of a solution of calcium chloride and copper sulphate dissolved in distilled water, plus oxalic acid at the rate of 20 ml per litre of developer. This will result in an image which is almost sepia coloured if the print is developed at about 15°C. After developing drain the print and put it directly into the first of three clearing baths. Each of these is a two per cent solution of hydrochloric acid in distilled water. Use three clearing baths in rotation. Immerse the print in each bath for three to five minutes, agitating continuously. The liquid should remain clear and transparent in the last tray instead of becoming discoloured as in the first. The print must be soaked for no more than fifteen minutes or the image densities will start to be reduced.

The clearing bath serves the same function as a fixer bath in ordinary black and white processing—it removes the unexposed photosensitive salts from the paper fibres. The more efficiently this is

done the more stable the print. In the immediate future it is likely that we will have two paths for clearing the print, both standardised clearing baths controlled by the standard developer, and a path placed by what was intended as the path and a fresh bath three days later.

If you add oxalic acid to the clearing bath then the clearing bath is exhausted and needs replacing. The yellowed clearing bath can be used for further clearing of prints, but not for printing.

Follow this with four fresh baths of distilled water for the addition of 10 ml acetic acid to each of the last three. This need only be used for the first. After the print can be dried from the tray.

If, after processing, you seek a different form of print contrast, you can do so either by mixing up a different emulsion next time or by using a print already been prepared and then a safe and develop print.

Platinum is used in the clearing bath during printing and the clearing bath is not needed for the clearing bath contrast in the print.

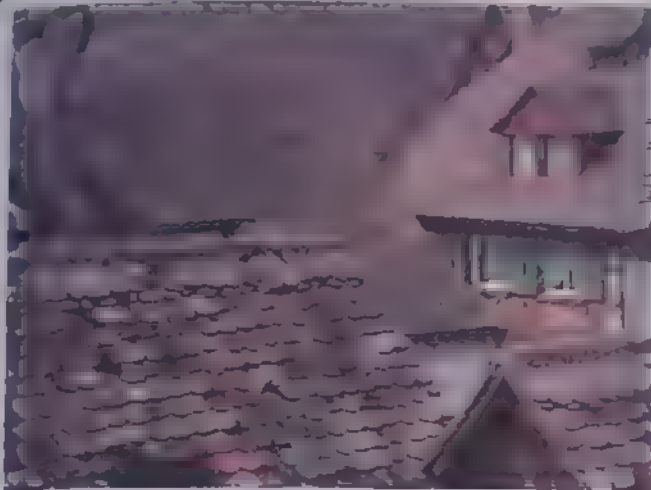
Another way to reduce contrast is to use a weaker developer. For a developer weaker than 1 + 200, use a developer that is 1 + 400. This will result in a print with extreme contrast. To reduce contrast, add reagent grade oxalic acid to each bath. The clearing bath is cleared, not to add oxalic acid to the clearing bath, but to add oxalic acid to the clearing bath.

Whatever happens, make notes. Keep track of what you do. The valuable platinum

What went wrong?

Rooftops

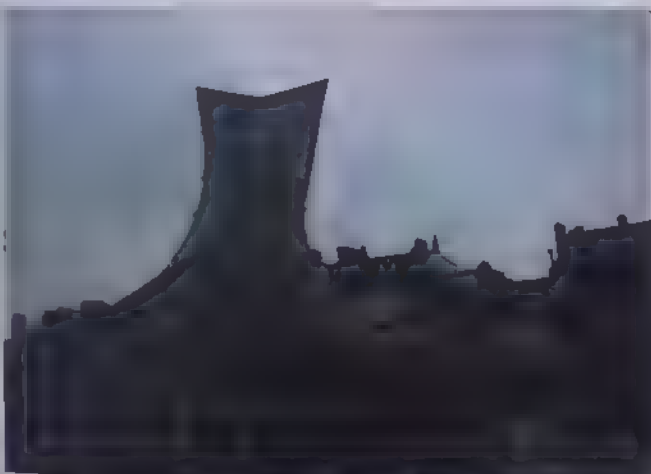
There are many interesting shots at roof level—an area which people often ignore. But there are problems of composition, as Colin Molyneux points out



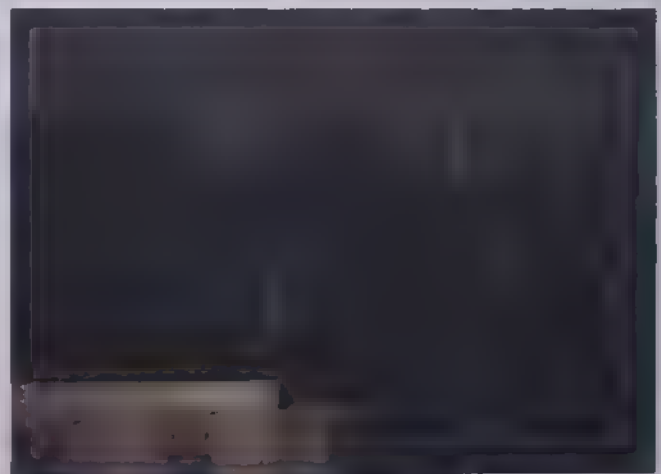
I can't really find a great deal to criticize in this picture, try as I might, and I don't think that presented with this subject I would have treated it very differently from the approach chosen. I like the way the horizontal and sloping lines of the roofs and tiles lead the eye naturally to the windows and facade of the house—and even though it is positioned nearly on the edge of the frame, the roof sloping into the picture helps tie the whole thing together. I also like the monochromatic colour relieved by the green shutters. I think I would have lightened up the composition a little, cropping just on the edge of the small chimney and leaving it and the dormer window on the left of the frame out of the picture. It is in instances like this where the ability to select just the right focal length makes a zoom lens worth any disadvantage it may have in weight and slow speed.



Here we have an interesting subject in good light, taken from an unusual angle—all of which should have added up to a striking photograph. The composition has failed to make the most of the possibilities, however. Offsetting the domes to the left of the frame has given the whole picture an unbalanced look. I would have chosen a vertical format for this shot, cropped through the centre of the small dome on the right and the centre of the foreground dome on the left. Although a longer lens would have been necessary to keep the top and bottom of the picture more or less as it is, this would have had the effect of concentrating attention on the two centre domes and emphasizing their shape and dominance over the roofs of the buildings behind. It would also have removed the flat roof on the right which is such a distracting element in the composition.



This photograph looks as if it was taken in a hurry. The photographer has seen something interesting and has grabbed a shot without giving much thought to the subject or the reasons for taking the picture. A sure recipe for failure. The point of interest is the tower-shaped roof. The way to have emphasized this would have been to use a vertical format instead of a horizontal one, a longer focal length lens and a lower viewpoint to hide the houses behind the subject and isolate the roof against the sky. Finally, better light would not have gone amiss. This approach would have concentrated the viewer's attention on the roof and portrayed the subject as a strong graphic shape, which it is. When it comes to taking good photographs a little thought and a lot of patience are more important than a vast array of equipment. Equipment just makes things easier.



In this picture of rooftops, I am not sure what the photographer was trying to capture. There are too many conflicting elements without one being dominant enough to stand on its own. A more selective approach would have been better. What you leave out of a picture is as important to the final result as what you actually show. A vertical format, for example, would have concentrated attention on the white building. Framing the picture to include the bottom of the windows, the roof, chimneys and part of the sky would have produced a stronger photograph. There is a lot of contrast in this scene which has created areas with little or no detail in them. If the picture had been taken when there was a little more light in the sky the contrast between the building and the roof would have been less, allowing more of the detail to show. Thus, I think, would have made for a more interesting shot.



Photo-etching

Copper plates for printing ink images of your pictures can be made by a simple photographic process—'photo-etching'. And with an etched copperplate, you can print a whole range of stunning artworks, either singly or in large numbers



Pauline Gentry

Some of the most interesting and versatile of all photo reproduction techniques are those used in the printing world. Once you can produce a fine image quickly and confidently you can begin to explore the possibilities of these techniques yourself and one of the most interesting is *photo-etching*.

Photo-etching essentially involves photographically transferring an image to a metal plate, etching away appropriate areas with acid, and using the

Artistic effects *Colourful and dramatic effects can be produced by skilful manipulation of photo-etching techniques*

etched plate to print ink on to paper. The etched plate can be used just once to make a single print or again and again to make numerous copies. Indeed you can use the process simply to produce the etched plate to use as a decorative plaque or a nameplate.

Any photograph can be used to make

an etched plate. The process is simple and can be carried out in a home darkroom. The only special equipment required is a UV light source, a UV sensitive photoresist, and a UV sensitive photoresist developer. The process is described in detail in the book *Photo-etching* by Pauline Gentry, published by the author.

Relief or intaglio

The photo-etching process can be used to produce two types of etched plate. The first is a relief plate, where the image is raised above the surface of the plate.

The second is an intaglio plate, where the image is recessed into the surface of the plate. The intaglio plate is the most common type of etched plate. It is produced by a process called *photo-etching*. The process involves exposing a photoresist to a UV light source, which creates a pattern of raised and recessed areas. The recessed areas are then etched into the surface of the plate. When the plate is printed, the ink is forced into the recessed areas, creating a high-contrast image. Relief prints are not particularly good for large solid areas. Photo-etched prints can produce attractive fine line detail when printed well. In photo-etching, the reproduction process is referred to as *letterpress printing*.

Intaglio photo-etching is the reverse of relief and is produced from a negative image. During exposure, the unprinted areas form a solid relief. The image is etched into the surface of the metal, the recessed areas being the deepest. A characteristic of intaglio printing is the printed edge. It depresses the printed image and produces a very attractive frame around the image. The most common example of this photo-etching reproduction method is *photogravure*, well known for the superb tonal image quality that can be obtained.

Preparing the plate

You can use one of a variety of metals for the printing plate. The two most popular are zinc and copper. Zinc is relatively cheap and is widely available. Unfortunately, it is more brittle in use than copper and can deteriorate under

Etching the plate



1 Essential equipment: smooth copper plate, Kodak Photo Resist and developer, acid, bitumen, lamp, brushes, swabs, rubber gloves and cleaning materials



2 Fine surface scratches can be removed with white spirit and hard charcoal. Wipe over with ordinary metal polish and polish to a high shine



3 Clean the plate again with a solution of 3 per cent caustic soda mixed with chalk powder to make a paste. Wash it off with weak acetic acid and wipe dry



7 Exposure is largely trial-and-error, but try exposing the plate with a QI movie light or UV lamp for about five minutes at a distance of about one metre



8 Agitate the plate in a dish of resist developer for five minutes. Then wash it under cold water until the image appears. The developer can be kept for future use



9 Make sure that the plate is completely dry then paint out the back with bitumen or any similar acid resistant substance—you may want to use it for etching later

pressure. Copper is more expensive than zinc, but it has many advantages. The etching is more accurate, giving better image control, and a top printing quality, and is much more durable.

Copper can be bought from a local merchant specializing in roof and roofing copper, or from a specialist in church spires. You can expect to pay about the price of a roll of black and white film for a sheet of copper. Carefully select a piece without any surface marks or deep scratches. Fine surface scratches can be removed by rubbing gently with white spirit and hard charcoal—both are available from artist's suppliers. Then wipe over the selected surface with an ordinary metal polish, dry it off, and polish the plate to a high shine using soft tissue paper. Handle the plate by its edges as fingerprints can leave grease on the polished surface.

Next, clean the plate with a solution of three per cent caustic soda and add some French chalk to form a thick paste—though ordinary caustic oven cleaner is a good substitute. Finally

wash the plate with a solution of sea salt and white spirit or acetic acid, and wipe it dry with clean tissue. The copper surface is now chemically clean. All these solutions can be prepared and used in ordinary plastic developer bottles.

Coating

Plated aluminium can be etched in minutes. A silver plate is used as a printing blank and white etch is preferred. Although the speed of the etching is slow, it is when it is plated with silver that the etching is best. It is best left overnight and can be finished by even polishing with a fine metal polish. A plate in a carefully selected distance of 100 cm from the light source will give the best coating during drying will give the final printing image.

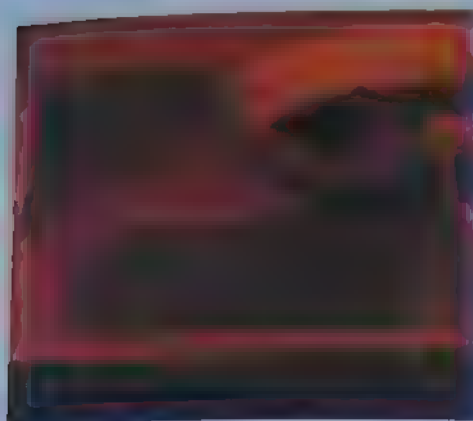
Use Kodak Photo Resist (KPR) for coating. The complete kit consists of three solutions—the resist, the resist developer and resist dye. Hold the plate on played fingers of one hand, and pour the minimum of resist on to the plate centre with the other. Roll your hand from the wrist, allowing the coating to

flow evenly over the whole surface. The resist should be applied in a thin, even layer. The resist should be applied in a thin, even layer. The resist should be applied in a thin, even layer.

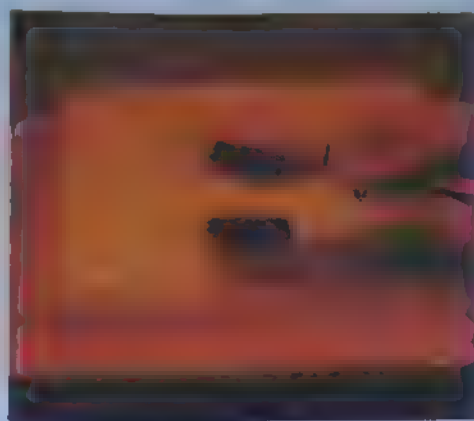
Exposure

When the plate is coated with resist, it should be exposed to light. The exposure should be made in a dark room. The exposure should be made in a dark room. The exposure should be made in a dark room.

Pour a quantity of resist dye into a dish and slide the plate beneath the top surface. A plate the plate is now ready for



4 The plate must be coated in a dust free working area under proper safelighting—KPR is sensitive to blue light and can be fogged even by weak daylight



5 Hold the plate on splayed fingers of one hand. Pour resist onto the middle of the plate and roll out evenly. Drain off any surplus and dry with a hairdryer



6 Lay your positive or negative on the plate emulsion down. Complete the sandwich with a sheet of float glass. Note the masks to preserve borders



10 Use acid resist to block out any areas you do not want to etch. Masked areas will subsequently print out as block colour in relief printing and as black in intaglio



11 After preparing the ferric chloride solution, pour it into a dish much larger than the plate. Lay the plate in the dish and gently swab it with the solution



12 After ten minutes, remove the plate and force spray it with tap water. Then lay it on a folded newspaper and swab with developer to remove all the coating

two minutes. Remove from the dish, and wash it with cold water until the plate appears dry. Pour the developer from the bottle for future use.

The etching stage

Make sure that the plate is completely dry and then paint out the back of the plate with bitumen varnish. This is a thick, black, sticky substance that will fill the recesses of the plate, leaving it clear for future use in a re-run, printing, with a different image. When the back is completely dry, wipe off the front to remove any bitumen, using the cleaning routine previously outlined. At this point you can mask with acid resist to block out areas you do not want to etch—if, for example, you wish to use one side of the plate to print multiple images. Masked areas subsequently left unetched will print as block colour in relief printing, or as black areas in intaglio.

A ferric chloride solution is ideal for etching. It is good for very fine biting of copper and is slow working. The appropriate strength for normal etch solution

could be made by mixing 90 ml ferric chloride in a half litre of water. Add approximately three drops of concentrated sulphuric acid to each half a litre of the solution, as well as an agent. Wear rubber gloves to protect your hands when mixing and using the etching solution.

Get a tap water developer dish that is much larger than your plate and support the plate in it with your hands. Pour a quantity of ferric chloride into the front part of the dish. Lay the plate with the exposed side up, and gently bathe the plate with solution, using a cotton wool swab. Keep repeating this action from the top to the bottom of the plate, replenishing the ferric if necessary. After ten minutes, remove the plate and force spray it with tap water. Lay the plate on a folded sheet of newspaper and, using a cotton wool swab soaked in KPR developer, remove all the coating

Aquatint

Where there are large solid printing areas in your etched plate, you can improve printing quality by spraying it

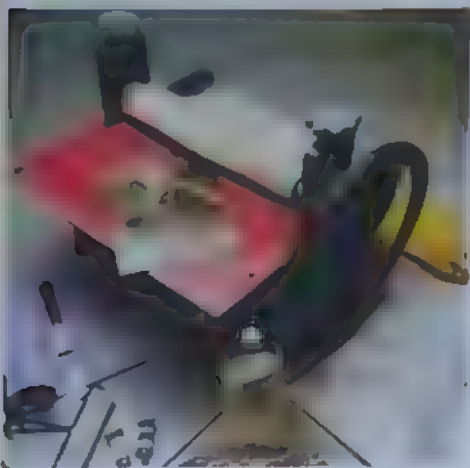
with a tint from a prepared aquatint. First paint out all the recessed areas with bitumen. When the bitumen dries, spray the aquatint upwards at the areas so that it fills in a minute. It forms a solid coating that you can remove. Bitumen is a product of the tar and is very sticky. Immerse your etched plate in the aquatint

Printing

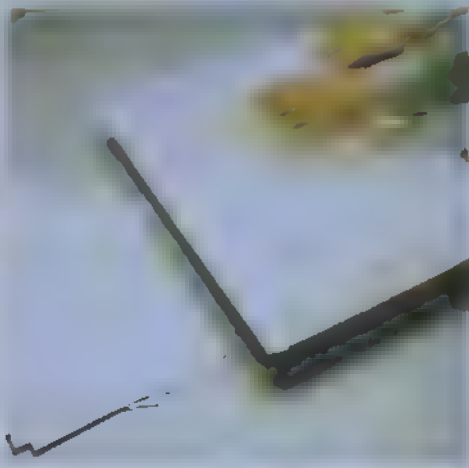
To print, cut a piece of paper for the plate. The paper can be any type of paper, but it should be the weight that you want to use for the final image. During printing, the paper expands and contracts. The surface of the paper should be creased. For a better result, soak the paper in water for a few minutes. The paper becomes pliable. It can then conform to the shape of the plate without tear.

The soaking time depends on the paper weight. Soaking time is a matter of minutes or hours. Thicker

Making the print



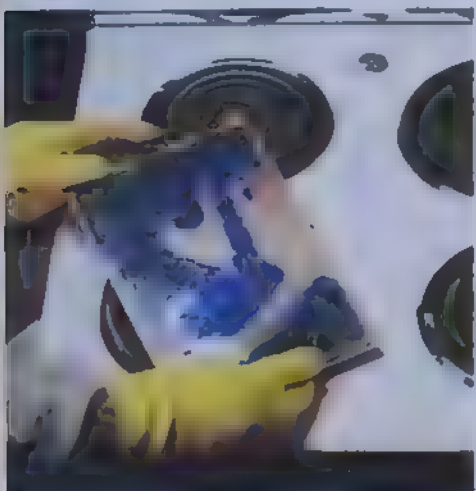
1 To make a print, you will need a mangle, special printing inks (or pigment and copperplate oil to make your own), a palette knife, paper and rubber gloves



2 First, cut and prepare sufficient paper for your printing run. Soak it in cold water until it becomes pliable. Then lay it between sheets of blotting paper to dry



3 Force the ink into the intaglio of the cleaned and warmed plate with a small piece of soft felt rolled up and taped to form a swab. Use a dabbing action



4 As the plate gets colder it becomes harder to drag ink out of the intaglio. If necessary rewarm the plate over an electric hob, set low, to keep ink fluid



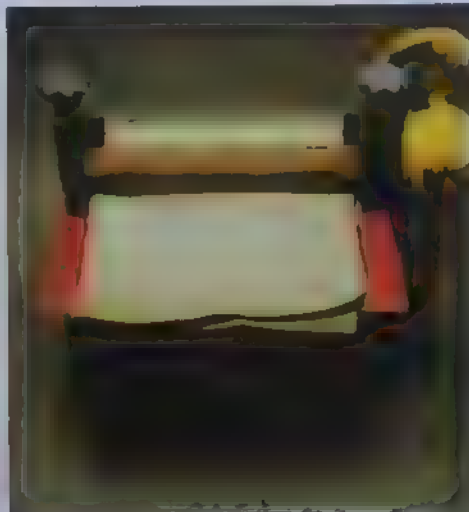
5 Carefully wipe the ink away from the top surface with a piece of soft muslin or scrim. This is available from the soft fabrics department of a general store



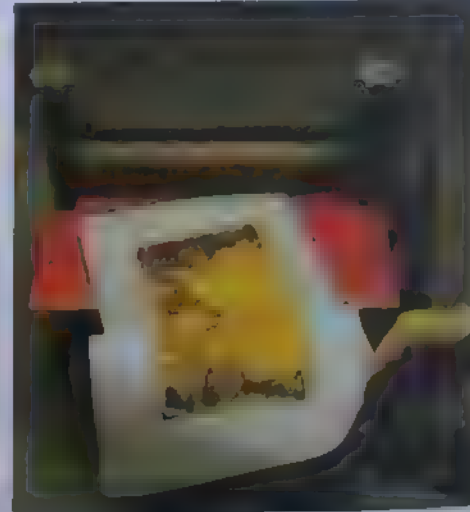
6 Two colour prints can be made by using one plate for both relief and intaglio printing. Once the intaglio is filled, ink the relief areas with a hard roller



7 Nip the inked plate between the rollers of your mangle. Then back the paper with a sheet of felt and feed the leading edge into the nip with paper facing plate



8 Wind the handle so the plate, paper and backing blanket feed through the rollers slowly and continuously. But do not let paper and plate touch until the nip



9 When the sandwich has passed through the mangle, remove the blanket, pick up one edge of the paper and carefully separate it from the plate in one movement

sheets are soaked much longer than those of lesser weight. You must find the time by trial and error, but start by

the paper and carefully separate it from the process for further prints. Hang the paper are dry

highest coil. Lay one sheet of paper it with marking tape along the leading

You can buy the spec from a printer's supply house or graphic arts suppliers. Ink for copperplate powder and copperplate your own ink. This gives you control over the ink. It can be bought in black, grey, and light. Try to keep the ink thick enough to remain in the printing. But if it is too thick, it will not print. Wipe clean the non-printing areas of the plate.

When mixing with a palette knife, the knife out of your mixed ink. If it drops off the knife, then the consistency is correct. A thick ink is better for aquatints with a shallow print surface. Where the etch is deeper, use a thinner ink. Wear rubber or polythene gloves when mixing and applying ink.

To make the print, the plate is inked and then brought firmly against the paper. Ideally a plate proofing press should be used, but you may be able to get access to one at a college or studio. An alternative is to use an old clothes mangle with rubber rollers, preferably with some degree of pressure adjustment. The mangle should be clamped firmly to the work table.

Start the inking sequence first by cleaning and polishing the plate with metal polish. Remove any accumulations in the etched recesses—the intaglio. Heat the plate on a dishwasher or electric cooker hob set on very low heat. When it is quite warm remove it from the hotplate. Roll up a small piece of soft felt and tape it to form a swab. Also cut a piece of felt slightly larger in area than the paper image area. Dab the ink onto the plate, forcing it right into the intaglio. Using soft muslin or scrim available from the soft fabrics department of a general store—carefully wipe the ink away from the top surface of the plate in a circular polishing motion. As the plate gets colder the ink becomes harder to drag out of the intaglio—but be careful not to overwipe.

Take the inked plate to your mangle and nip it between the rollers. Back the paper with a sheet of felt—the *backing blanket*. Feed the paper and backing into the rollers—the paper facing the plate. Hold up the other end to keep the paper clear of the inked plate.

Wind the handle so the plate, paper and backing blanket feed through the rollers slowly and continuously. Do not let the paper or plate touch until they meet at the nip of the rollers. When the sandwich has passed through the mangle, remove the blanket, lay the plate on the table, pick up one edge of

Multicolour printing

Once you begin to print, you can try and two. This is done by making separate plates for each colour. Indeed, you can make full colour prints by making separate plates for each colour and then printing them one after the other. This makes a register.

But before you try this, it is best to try simple printing first. This is done by making a single plate for each colour and then printing them one after the other. This makes a register. This is done by making a single plate for each colour and then printing them one after the other. This makes a register.

Embossing

When you have a plate that is ready to print, you can use it to emboss. This is done by making a plate that is ready to print, and then using it to emboss. This is done by making a plate that is ready to print, and then using it to emboss. This is done by making a plate that is ready to print, and then using it to emboss.



Plate or print When cleaned and varnished, the printing plate makes a decorative item in its own right—whether used to make prints or not

Camera construction

Cameras have come a long way since the days when they were all polished wood and brass and the light, compact and durable cameras of today owe much to the incorporation of a variety of new materials, from special alloys to plastic

Body materials

The camera body is the central component of the camera, housing the lens, shutter, film magazine and other essential parts. Traditionally, camera bodies were made from polished wood and brass, which gave them a classic, elegant appearance. However, these materials were often heavy and prone to wear and tear. In the mid-20th century, the introduction of plastic and metal alloys revolutionized camera construction. Plastic bodies became popular for their lightweight and durable nature, while metal alloys offered a more robust and precise construction. Today, camera bodies are often made from a combination of materials, such as plastic and metal, to achieve the best of both worlds: light weight and durability. The choice of body material can significantly affect the camera's performance, particularly in terms of weight, balance, and resistance to environmental factors like moisture and dust.

Fashioned in teak, this splendid 5 × 4 inch format camera becomes fully functional once the protective front plate is removed and a conventional lens fitted

Left: A 100 mm lens mounted on a camera body





Thin, alloy, die castings of a 1950s Leica IIIIf shutter crate assembly are revealed by stripping away the decorative blackening



Folded brass sheet shutter crate of a 1932 Leica II, with blackening removed. Folding brass requires great skill, and the result is less rigid than a casting

demonstrated in the Nikon EM, is the use of a light alloy 'skeleton' where dimensions and rigidity are critical, together with a moulded-on plastic underbody to flesh it out. This makes for an extremely light and strong form of construction that could well be used more and more in producing high quality, low-cost cameras.

Boiled directly to the chassis is the lens mount, which must withstand the wear and tear of lens changing. Hard stainless steel is favoured for many professional cameras, though plated brass or steel is more usual on less expensive models.

The function of the outer casing is to protect the delicate inner mechanisms of the camera from blows, dirt and moisture. Pressed plated brass is the traditional method: it is reasonably cheap, quite strong enough unless made far too thin, but rather heavy. For this reason it has been supplanted to a certain extent by plastics, which can give just as much protection, are lighter and can be formed very much more cheaply. It is difficult to make plastic sufficiently thin and rigid for the camera

body, though, and the use of a light alloy 'skeleton' is often necessary.

Plastics

Though the use of plastics in camera construction is increasing, there is still a long way to go before plastic can replace metal as a primary material. Plastic is still too soft and too brittle to withstand the stresses and strains of a camera body, and it is still too expensive to use in large quantities.

It is possible, however, to use plastic in a limited way, where it can be used to form a protective underbody, or to form a lens mount, or to form a shutter release button, or to form a viewfinder window.

Lightness and strength are achieved in the modern Nikon EM, which employs a light alloy 'skeleton' fleshed out by a low cost moulded-on plastic underbody

body, though, and the use of a light alloy 'skeleton' is often necessary. Plastic is still too soft and too brittle to withstand the stresses and strains of a camera body, and it is still too expensive to use in large quantities.

It is possible, however, to use plastic in a limited way, where it can be used to form a protective underbody, or to form a lens mount, or to form a shutter release button, or to form a viewfinder window.

The day is also not too far distant when the inner lens elements will be made of plastic too. Because these would be moulded rather than ground, the lenses that incorporate them will also be much cheaper. There is already a price advantage to camera bodies that incorporate plastics, for the material is both cheaper than metal and easier to shape accurately.

The only real drawbacks to plastic are its appearance, which many people do





not care for, and the fact that it is a rather slippery diamond is itself a greasy or noisy!

Mechanisms

The film transport gears must be strong, smooth, and tough: phosphor bronze is ideal, though brass and steel are cheaper and easier to work, and steel is stronger. All three materials are used, though the bronze is usually reserved for top-flight cameras. Shutter gears are usually subject to much lower stresses, so brass and steel are perfectly suitable. In some positions, hardened steel is the preferred material, as it is extremely strong and rigid, while if properly used its brittleness is no disadvantage. The spindles and revolving shafts are best made of tough, cheap steel.

In a few low-stress applications, plastic and even die-cast parts are found; typical uses are in guiding mechanisms, or in other places where heavy wear is not expected. As well as being cheap to make, plastic gears can be very smooth and quiet if the right plastic is used, and the mating surfaces are sufficiently large; they may even replace metal gears in more demanding situations. For the leaves of a between-lens shutter or the blinds of a focal-plane type, a very light but very strong material is needed: very thin steel (sometimes stainless) is the favourite, though titanium is used increasingly.

The controls should be easy to grip and quite strong—they are, after all, the parts most likely to be damaged by careless handling. Metal can be knurled or rigid to give a very good grip: die-cast light alloy is usually strong enough, though brass is even better. Plastic tips

Cast alloy body of a 1950s Gallus. The camera is fitted with a 50 mm f/3.5 Tessar type lens and gives 16 exposures on a roll of standard 127 film.

Finishes

There are two main types of finish: a polished metal finish, which is not fashionable but is functional and hard-wearing for professional cameras; and a painted finish, which is fashionable but is not functional and hard-wearing. The painted finish is usually a matt black or a matt silver, and is applied by electroplating or by painting. The polished metal finish is usually a bright chrome or a bright nickel, and is applied by electroplating. The polished metal finish is not fashionable, but it is functional and hard-wearing for professional cameras.

Hasselblad use polished alloy finish to good effect. This type of finish is not fashionable, but it is functional and hard-wearing for professional cameras.





A partly sectioned Leica reveals the large number of components, as well as the many different types of material that comprise a modern camera. Some cameras could be assembled from components made at a single factory, but it is more usual (as at the Leitz works, below) to buy in certain specialist components

to other types than the 16mm
various European countries and
as the most important, but this
effect is not possible, it is the
showing clearly that the camera has
been heavily used. Steve Edwards
lasts well, though it is more used on
air than on the ground cameras.
I believe, this is better than is
even the other part. The last
day, this is a very good and
clear film and is 1951.

Body coverings of leather, rubber, plastic, vinyl, and other materials are more popular than ever before. They promote a clean, modern look and are easy to maintain. Rubber and plastic are also more durable than leather and vinyl. They are also more affordable. The use of these materials in body coverings is a trend that is likely to continue for some time.

With such a choice of models, finishes and customizations, it may seem that the designer has a hard time. This is true. The art of camera construction is a constant struggle to build a precision instrument that is as hard-wearing as possible at a price the photographer can afford, and which will also have that elusive quality of feeling right in the photographer's hands.





World of photography

Jay Maisel

An intense enthusiasm for the qualities of colour and light and the ability to capture them on film have made Jay Maisel one of the most sought-after photographers in New York

Jay Maisel is one of the United States most flamboyant photographers. He is often to be seen striding around his native New York wearing Nikons like other people wear amulets, frequently with a large cigar protruding aggressively from his mouth. If he sees a good shot he is likely to stop his car right in the middle of a busy New York thoroughfare to capture it, or climb to a precarious position on scaffolding for the right angle on his subject.

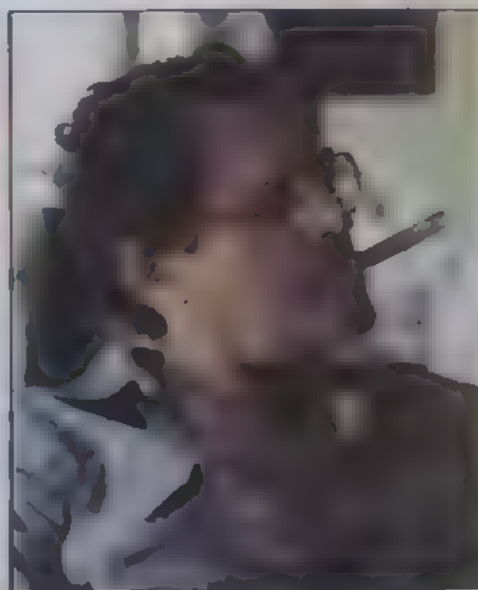
In contrast to his extrovert personality Maisel's pictures reveal quieter and more reflective, if no less exuberant, concerns. They show an enthusiasm for the purity of colour and light—often in its most romantic and lyrical aspect. Some of his characteristic images include light glinting on telegraph wires in the early morning, the afternoon sun reflected on the nape of a woman's neck as she waits in a taxi, an enlarged moon balanced precariously between the twin towers of

Salvador, 1977 *One of a series of personal pictures that Maisel took in Brazil to accompany a record of Bahian songs*

Golden Gate Bridge *A superb early morning shot taken for Maisel's book on San Francisco for the publishers Time/Life*

the World Trade Centre and the subtle bands of muted colour created across a landscape on a misty morning.

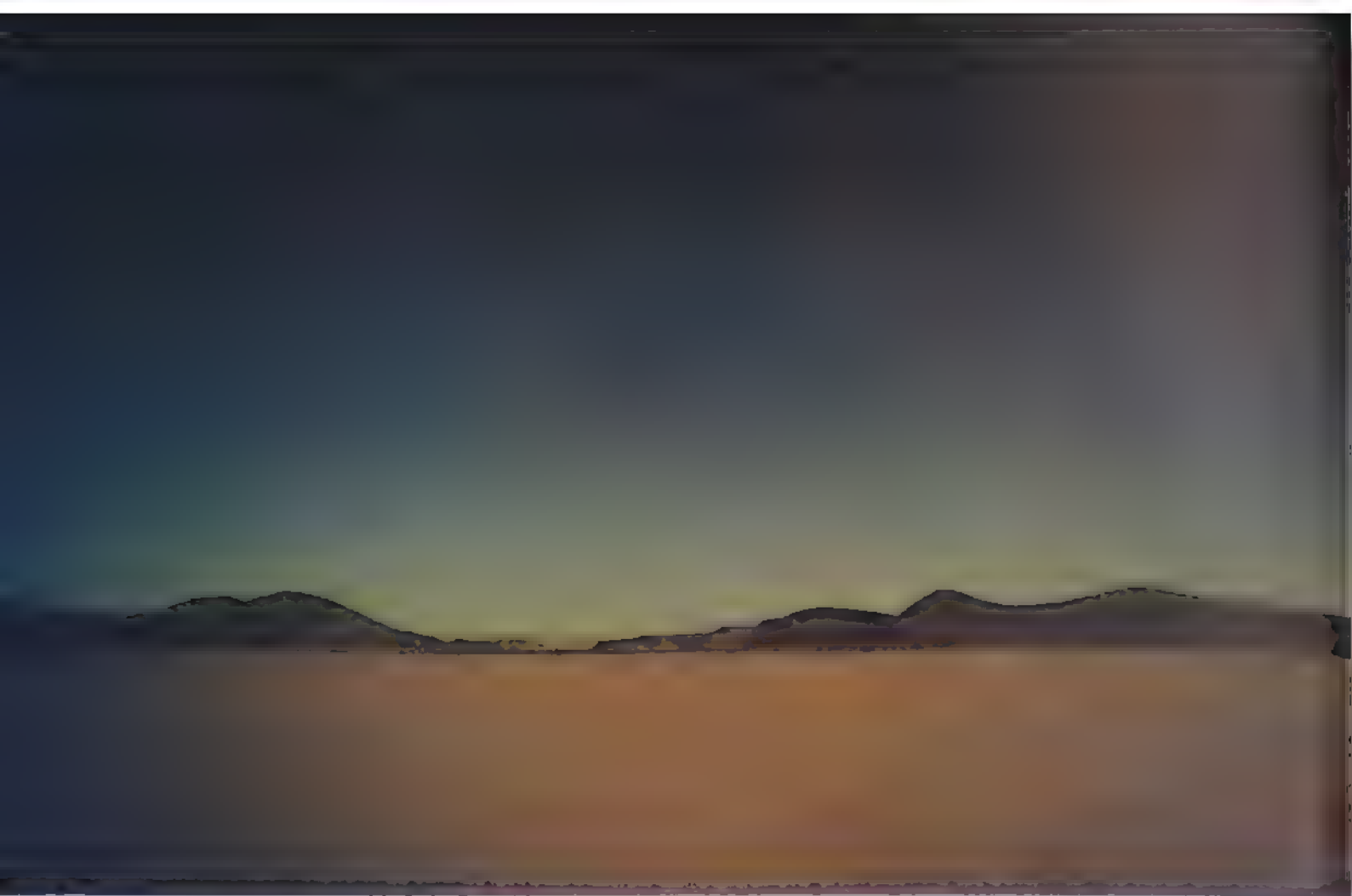
All these images occur repeatedly in life but by translating them on to film with his expert eye for colour and composition, Maisel makes us notice them as if for the first time. In his constant search to present the lyrical aspects of life in a fresh and original way he can continually present an old and clichéd subject from a new and breathtaking viewpoint. He has, above all, a painter's eye for seeing colour, line and form, but prefers to express himself on film rather than canvas.



One of the major influences on Maisel's career was his initial decision to become a photographer, but a painter first. He was a talented artist, his overriding passion. And to this end he went to art school in New York. But he was fascinated by the human form, he discovered in the end that painting was not the right medium for him.

Towards the end of his time at school he started taking photographs. He was fascinated by the architect Buckminster Fuller, and in his last year gradually became more interested. With the aid of a camera he found he could create beautiful pictures





instantaneously. Photography was really good for me because I'm really involved in instant gratification. Painting was very tortuous. You have to work on a painting for months to get it right.

Finally, Maisel received his degree from art school and set to work to become a professional photographer. At first he took evening jobs in factories—taking photographs during the day working in the evenings printing at night and sleeping hardly at all. Even so, six months of this showed him that photography was the way he wanted to earn his living.

He approached his father for a wealthy man but as Maisel says, always very generous in times of need. As a result, Maisel's father gave him six new months with a guaranteed income of \$60 a week. He was on his way. Six months later, he had established himself sufficiently to pay his father back.

In those early days at the end of 1950s he graduated fairly quickly from portraits of musicians, dancers and actors to assignments to cover the Newport jazz festival, a series of advertisements for a pharmaceutical company and a range of album covers for Columbia. Like most photographers at that time, Maisel worked exclusively in black and white. It was only later in the early 1960s that he began to do the colour work that has now formed the basis of his considerable reputation. By this time Maisel was in his early 30s and had already been doing both editorial and advertising photography for some time.

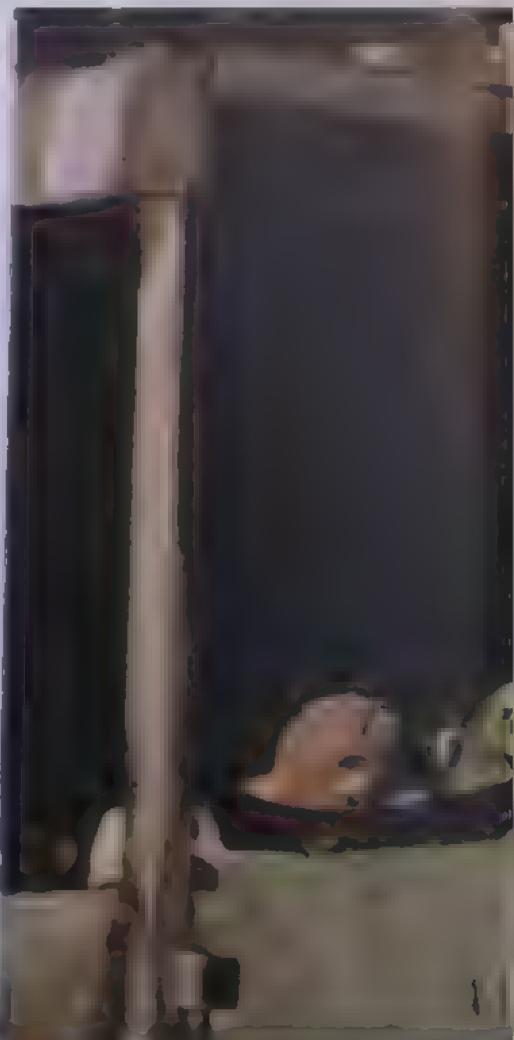
As he says now, Colour was a natural evolution for me. Although I enjoy black and white photography, I like colour so much more. There's a sensuality about colour that I really like which isn't present in black and white. Often for me the interplay of colours is the content of a picture. Generally I would hope that a picture is more than just colour but I'm not embarrassed if an image stands purely on its value as an arrangement of colours and tones.

Maisel traces the beginning of his great success as a colour photographer to a visit he made to Europe in 1963. During the time he spent there he shot 200 rolls of both colour and black and white, largely on commission for European clients, including an assignment for a major German advertising agency. But it was the colour that first interested him.

The early 60s were an exciting time for photographers. Illustrated magazines were still in their heyday and were beginning to publish colour more and more. Advertising was starting to create a great demand for photography. Major industrial conglomerates also began to pay large sums for high-quality colour photography for both their advertising campaigns and increasingly for prestigious annual reports.

Nowadays, Maisel's income still comes mostly from the commercial market, although he travels the United States and the world photographing everything from factories to landscapes for clients as diverse as the Texaco oil

Baja, California The receding tyre tracks add a feeling of emptiness and space to this shot for a book about this desert landscape



for your man.

But taking on
range of areas not only be pro-
bated in. By referring to it
reputation as a ph
turn his hand to m
and always p

photographic

Maisel

tant at 11:15

photograph

ill rather l

he running

much more i
good the

white photography w
so Maisel q

gallery

colour photogra

greater res

potential, Ma

increasing

proportion

photograph

success st

called his love-a

It is not ju

living but a

When

to phot

view fr

endless

and apartm

look out of th

day to see ten

want to take And

are different

different shade

of a woman at a

feeding pigeons on l

To Maisel they are

rate beauty to be foun

the key to his

describes it, 'I re

little like the kids you see in the

who walk around with radio

their ears I do it with my eyes and a

camera

In spite of this enthusiasm for



Rolling along the highway The atmosphere created by late afternoon sunlight is one of Maisel's favourite subjects.

The wink A personal picture that Maisel took in a Sao Paulo market while he was travelling in Brazil on an assignment



New York skyline
The Empire State Building is the tallest building in the world. It was built in 1931 and is a landmark of New York City. The photograph was taken from a boat on the Hudson River, looking towards the city.



Commercial processing

To handle the vast number of films sent in by the public, commercial processing labs have developed highly specialized automatic systems and many photofinishers are beginning to exploit the power of computers

The vast majority of amateur photographers trust their films to commercial processing and printing laboratories. Few people have any knowledge of what goes on inside them, yet the work done by such a laboratory can affect the results you get much more than the quality of your camera, lenses and film. A modern laboratory—called a photofinisher or D & P (developing and printing) lab—is a mixture of advanced technology and old-fashioned hand work.

Getting your own back

It is important to make sure that each customer receives their own film and prints back, and even this apparently simple matter is now subject to electronic systems.

The simplest method, still widely used, is to make out a docket for each film and keep the cassettes in strict order. They are loaded in order on to a rack from which they can only be removed in the same order. Other systems involve numbering each film, and there are several ways of doing this. Paper labels will pass through the machines only if they are heat sealed on to the film—heat sealed tape is very strongly fastened. A machine automatically sticks one label on the end of the film and one, with the same number, on the customer's docket as it loads the film. Alternatively, a number is exposed on the spool end of the negative.

The most advanced system is found on Kodak's Disc film. Each disc has a number shown in bar code for an optical reader to interpret. It is also exposed on the disc and is even coded on a magnetic recording layer. This number stays with the disc for manufacture, and is therefore a very secure method of identifying it. In the most sophisticated version, the bar code is read using an optical wand by the



operator as the film is loaded in to the automatic machine.

After identification, films are spliced together and wound on a reel with blank leader and trailer on the ends. The reel is housed in a light tight magazine in which it can be taken to the processing machine.

Colour negatives

Virtually all makes of colour negative film are now processed by the Kodak C-41 process in Flexicolor chemicals. The solutions—colour developer, wash, bleach, fix, wash and stabilizer—are contained in deep tanks with rollers at the top and bottom. A drying compartment at the delivery end of the machine dries the negative with a current of warm air. When in use a continuous processing machine has to be kept threaded, so blank film base draws a batch of films through the machine and the processed negatives pull through further film base as they proceed through the solutions. A typical machine delivers dry negatives at the

rate of 20 m per minute which is equivalent to about 500 35 mm negatives a minute.

The temperatures of the various baths are controlled by thermostatically controlled heaters and the solutions are circulated by pumps and continuously replenished to restore the activity lost through use.

The reeled negatives are passed to the printing machine. Modern machines are fully automatic and are controlled by computer. Postcard-sized prints involve a fixed magnification of about $3\frac{1}{2}$ times for 35 mm negatives but this can be changed to suit other negative sizes. The evaluation and exposing gates are interchangeable so that all the popular negative formats can be accommodated.

Fully automatic printing

The latest automatic printers do not need an operator constantly watching over them. Loaded with a reel of negatives and a roll of paper with the computer control set for the batch of paper and the make and type of negative

Auto prints are delivered in rolls after processing and then inspected by eye

film, the machine does the rest at the rate of perhaps 1200 prints an hour. Each negative is drawn into position over an evaluating aperture where its blue, green and red light transmissions are measured and the exposure sequence set. While this is taking place a previous negative is being printed.

A fast auto printer exposes by the subtractive method. At the start of the exposure, unfiltered light reaches the paper and when the paper layer requiring the least exposure has received enough light, a yellow, magenta or cyan filter is moved into the light beam by a solenoid to stop the light to which the fastest layer is sensitive. When the fastest layer is exposed, the filter is moved back to the start position and the next layer is exposed. This process continues until all the layers have been exposed. The film is then developed and the prints are inspected by eye.

reaching the film. The order in which the filters go into the beam depends on the characteristics of the negative and paper. At the fast rate of printing of more than 1000 prints an hour, the total exposure for each print is very brief—less than half a second.

Paper processing

Continuous processing machines for paper involve only two solutions—colour developer and bleach-fix. A final short wash is provided to remove all soluble compounds from the print emulsions. The prints are heat dried and delivered in a continuous roll.

The two solutions are continuously replenished and are maintained at the correct working temperature to within a small tolerance. The solutions are agitated by either circulating them with paddles or by bursts of nitrogen gas.

The finished prints are inspected and unacceptable ones that need to be reprinted are marked in black crayon. Despite automation, this task must still be done by a human operator. An automatic trimmer cuts up the prints and divides them into three lots: acceptable, those for reprinting and complete rejects. The current fashion for borderless prints reduces trimming to a single cut. The images on the roll of paper are separated by only a hairline of white and they go right to the edges of the paper.

Colour slides

Reversal processing of slide film may be done with a continuous processing machine similar to that used for negative films. Most reversal films are now processed by the Kodak E-6 chemicals and these involve nine steps calling for an elaborate machine. The alternative method is known colloquially as 'dip and dunk'. Films are hung in clips on frame with weighted clip on the lower ends. The frame is then lowered into deep tanks of solutions. Agitation can be by jets of gas or by simple raising and lowering of the films on their racks. Transfer from one solution to another is mechanized.

Black and white

Monochrome films are nearly always developed and fixed

machine is not appropriate for films that may call for different development times.

Automatic printers for monochrome negatives are similar to colour printers but are much simpler. The exposure given is an average for the whole negative area, which is not wholly reliable in the case of negatives with unduly large highlight or shadow areas. With some printers the operator is able to compensate manually for abnormal negatives.

As a rollhead printer can be loaded with only a single grade of paper, negatives of different contrasts have to be catered for either by *flashing* the paper for high contrast negatives or by using a type of paper whose contrast depends on the exposure it is given. If a paper of fairly high contrast is given a very brief exposure to light before it is exposed, its effective contrast is reduced. Printing machines often make provision for flashing.

Paper specially designed for photofinishing has characteristics such that a thin, flat negative can be made to yield a print of adequate contrast but negatives that are denser and of higher contrast give flatter results. This is not a wholly satisfactory answer to the problem of negatives of different contrast but it gives acceptable results in most cases.

Process monitoring

Colour processing demands careful monitoring if a high standard of quality is to be maintained. Exposed but unprocessed control strips on film and paper are available from material manufacturers and one of these strips is processed at regular and frequent intervals. Various key densities on the processed strip are measured and plotted on a process control chart. On this chart are indicated the limits outside which the selected densities should not go. Results outside the permitted tolerances indicate a fault such as incorrect replenishment or solution contamination. Adjustments can then be made.

Disc processing sequence



All stages in the Kodak disc film processing sequence can be fully automated: from magnetic identification (top) through processing and drying to printing (bottom)



Creative approach

OUTDOOR NUDES

Whether the location is a woodland glade or a desolate expanse of salt flats, photographing nudes outdoors frees you from the confines of a room or studio and allows you to combine the human form with the contours of the landscape





Red field Outdoor nudes are good subjects for special effects—here infrared film and a sepia filter caused this unusual coloration. **Rockface** Rather than simply setting the nude in the landscape, make the landscape and nude work together—here black and white film enhances the contrast in textures. **Beach** Underexposure creates strong shadows in bright sunlight.

have a very natural look to them. In classical art, sylvan settings were very popular for nude studies since the figures became water or woodland creatures rather than simply naked people. This approach is perhaps the least likely to offend people—the erotic or glamour overtones are easily played down, which is why it was much more acceptable to Victorian eyes.

There are occasions when a broader sweep of landscape can be included in an outdoor nude. For instance, in an area of gently rolling hills it is possible to combine a close-up shot of the undulating curves of the female form with the background clearly visible so that the similarities in shape are emphasized. The extreme depth of field of an ultrawide angle lens or a split head attachment on a standard lens could be useful for this. Alternatively, you can take two separate pictures and combine them later, by making a sandwich from two or more transparencies or by a combination printing technique.

Pastoral settings are usually the first

that spring to mind when planning an outdoor nude session but by exploiting the element of surprise it is possible to make use of far more unkey locations. Great potential exists for the intrepid photographer and model who are prepared to venture out into urban locations—a well-known landmark or building or perhaps a city park with a familiar skyline in the distance. Of course, authorities may frown on such

activities and it is likely to draw a large crowd for the best part of the day, really early in the morning before everyone else awakes and with it quickly as possible. The effect of a nude model outside a famous monument or regal building can often be very funny.

However, whether aiming for a comical juxtaposition or a subtle blend of human form in soft natural surroundings



Michael Bussell



it is important to pay a
background

The effect of the backgr
controlled by in
hooting down on i

FAO C C D G I J P R




Girl and rocks Late afternoon light helps to
give skin and setting, a warm tone which
contrasts with the blue sky

light and skin texture. It can also play an
important role in the overall
ground

the actual appearance of the scene

Swimming pool Manmade features, such as
this swimming pool, contrast well with the
colour, texture and rounded form of the body





Changing shape Camera movements give you a great scope for controlling the shape of the image. Either to keep the natural shape of the subject, to achieve an unusual viewpoint, or to introduce subtle distortions

Improve your technique

Large format technique-2

Camera movements are an extremely useful feature of large format cameras. But you must use them carefully and methodically if you are not to end up with the wrong effect—or no effect at all

Many people think that a large format camera merely gives you a bigger picture. But these cameras have other advantages, the most important of which are the various movements that they allow. These camera movements give immense creative control. You can move the image on the film, alter the plane of focus, or even change the apparent shape or perspective of the subject.

But even though the effects of these movements are visible on the focusing screen of the camera, it is important to know what to expect before making a move so that you can work in a structured and logical way. If you work haphazardly you may eventually achieve the desired effect, but more often than not you will simply cancel out previous movements. For the sake of clarity, movements can be broken down into three main groups—shift, swing and tilt, and back movements

Shift movements

The lens can be moved in four directions in a plane parallel to the film and these movements are known as *shifts*. The vertical movement is known as a *rising front*. If the lens can be lowered as well, it is said to have a *drop front*. The horizontal movement is called *cross front*.

Rising front is the most common of all movements, and almost all large format cameras have this feature. A drop front is less common, but the effect of a drop front can be duplicated several ways.

At the simplest, you can just turn the camera upside down—some manufacturers supply a short outrigger for doing this with an ordinary tripod. Another approach can be used with technical cameras that have a *drop bed*. This is mainly used to swing the front of the baseboard down so that it does not appear in the picture when wide-angle

lenses are used, but with longer lenses the front panel—the *lens standard*—swings down with it. If the *tilting front* (see below) is used to bring the lens panel back to parallel with the back, you have an effective drop front. With a monorail, a similar procedure is possible, if the front and rear standards are both tilted so that they are parallel, the rail itself can be tilted until the standards are once more at right angles to the ground. This is known as *indirect displacement*.

If cross front is not actually fitted, it can be obtained the same way. Just turn the camera on its side or (with a monorail) use the *swing* movements (see below) both back and front.

The effect of all the shift movements is to move the image on the ground glass or film. If the lens is moved upwards, the image moves upwards; if it is moved

Types of camera movement



Normal position



Tilting front



Tilting back

Swing movement



Rising front



Drop front



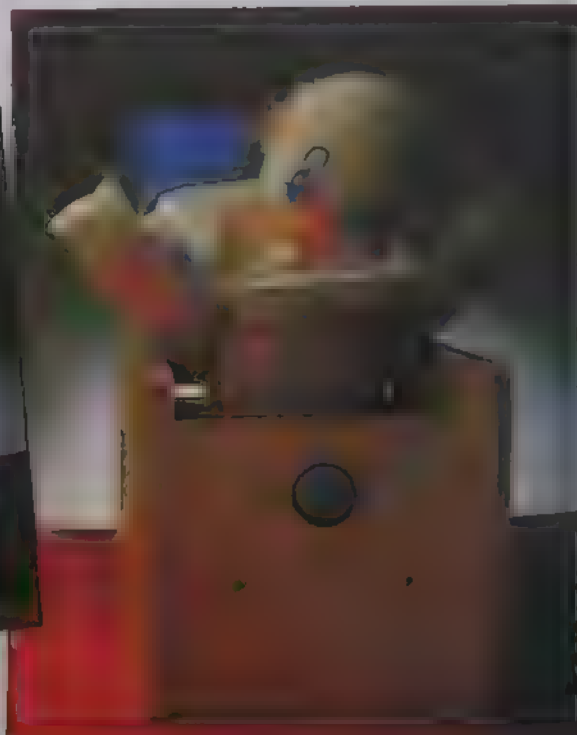
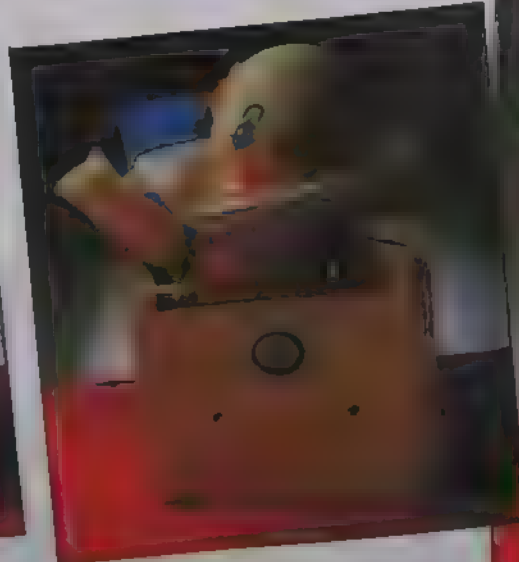
Indirect displacement



Cross movement

[illegible]

Cross view A straight-on viewpoint (left) gives little idea of the depth of the object. By using cross front the side of the object can be seen, though the front stays square to the frame (right). But using cross back as well introduces distortions (centre)





Straight edge Drop front has been used here to keep the edges of the door parallel while using a high viewpoint

sharp definition within the general image circle is very much larger than on others. As a general guide, the slower the lens, the larger the sharp area.

In practice, there is rarely any need to have the latest and best lenses in large format work, because the degrees of enlargement are so small. With the very largest formats—10 × 8 and above—lenses dating from the early years of the 20th century are still in everyday use. Some of these lenses work best at very small apertures ($f/45$ to $f/90$) so a few photographers do not even use shutters—timing the exposure with a stopwatch and a lens cap is perfectly adequate for black and white work where reciprocity failure will not cause a colour shift. In bright sunlight, though, you may need to use a neutral density filter to make the exposures long enough to be controlled in this way.

Despite mechanical and optical limitations, the range of shift movements available on large format cameras vastly exceeds that available on any perspective control lens for smaller cameras, and it is available when using lenses of a wide range of focal lengths.

Swinging and tilting

Lens swings and tilts also involve moving the lens panel, but instead of being parallel to the film plane these movements are about the vertical, swing, and horizontal, tilt axes respectively.

Their effects are quite different from shift movements, but they are similar to each other in that they have the same effect but in different planes. So it is possible on cameras without swing to get the effect of a swing movement simply by turning the camera on its side and using the tilt. This is almost universal on large format cameras, while swing is somewhat less common, being largely confined to monorails. So it is the use of tilt which is described here, though swing does the same thing on the vertical axis.

If a lens is tilted on its axis, the plane of focus tilts with it. This may seem at first to be nothing more than an optical curiosity, but in practice there is one major and one minor application.

The major application makes use of the Scheimpflug principle (see page 779). If imaginary lines drawn from the subject plane, the lens panel plane, and the image plane all coincide at the same point, then everything in the subject plane is in sharp focus. This may be a little hard to visualize, but an example makes it much clearer. Imagine that you

are looking at a scene through a camera. The scene is a flat surface, say a wall. The camera is tilted so that the lens is not perpendicular to the wall. The image on the film is a distorted version of the scene. The image is stretched out, and the perspective is changed. The image is not a true representation of the scene, but it is a useful one.

The minor application is when you want to focus on a single subject. This happens when you want to concentrate attention on a single subject. This happens when you want to focus on a single subject. This happens when you want to focus on a single subject.

This brings in the concept of on-axis and off-axis movements. On-axis movements can apply to both swing and tilt. They refer to the optical axis, which is an imaginary line running through the middle at right angles to the lens elements.

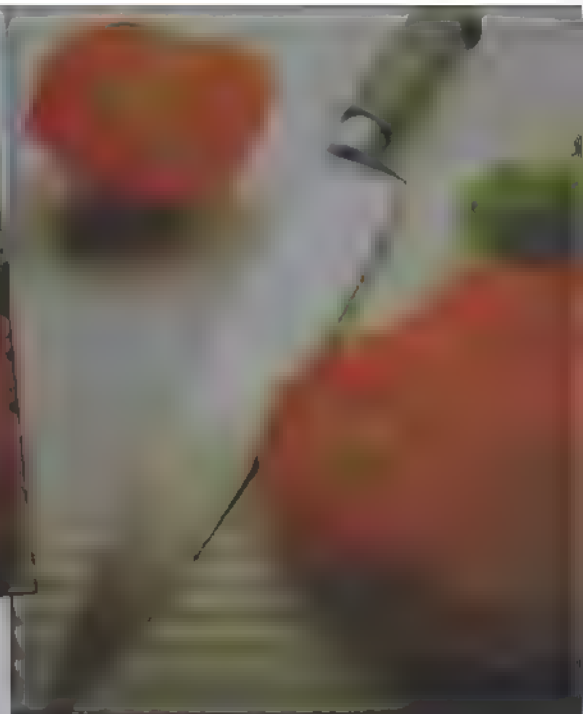
Off-axis movements were the first type. They are cheaper and easier to design and manufacture, but they are more difficult to use. In a type of tilt, the lens standard (the posts carrying the board) is hinged at the base. When the standard is tilted, the whole lens moves either backwards or forwards, and the focusing must be adjusted accordingly.

With an on-axis tilt, the lens board tilts inside the standard, and the optical axis intersects the optical axis. This means that this is that the on-axis image can change focus—though, of course, the image above and below the axis can't. This enables the effect of a tilt to be assessed immediately, without any need for refocusing, and so it is much easier to use. When you are more experienced, though, the off-axis is not really all that much more difficult, time consuming.

Back movements

The backs of most large format cameras also feature some movements. Most have tilt, and possibly swing facility, while monorails also have shift movements.

Although at first sight back swings and tilts may seem to have the same effect as the corresponding front movements, this is only partially true. They may be used to duplicate the Scheimpflug effect, but because the image is thrown on to the screen at a more oblique angle, the image shape changes. It is, in fact, stretched out, and the perspective



Deep focus Even at small apertures the depth of field with large format cameras tends to be too small (left). Using front tilt gives a plane of sharp focus which recedes from the camera, giving more depth (right), though excessive tilt causes cut-off (centre)

becomes steeper. So the real uses of the back movements are the alteration of image shape, and the alteration of apparent perspective.

By using the back movements you can exaggerate or decrease existing perspective, or add a perspective effect to something which had in fact been photographed flat. Buildings are not the only possible subject—the same technique is used by advertising photographers to stretch cars or turn cereal packets into towering blocks.

Back movements are the only real way to 'control' perspective. As explained above front shifts merely move the image about on the film, so the only effect on perspective comes from not having to tilt the whole camera. The effect is easily seen by analogy with a projected slide. If you move the projector up and down, the image moves with it, but if you tilt the screen at an angle then the image is distorted.

Tilting the back of the camera has exactly the same effect. That part of the image which is furthest from the lens is bigger than that part which is nearest. It is also probably out of focus. Swinging the lens to try to increase apparent depth of field simply results in making the two standards parallel again (in the case of a flat non-receding subject) so the only new effect is a shift. Consequently, focus is controlled by conventional focusing plus plenty of stopping down.

If the back is swung or tilted and then the whole camera is moved so that the back occupies the same position in space as it did before it was swung, the net result is a front swing or tilt. This demonstrates that there is more than one way to achieve a given effect. It also shows how essential it is to work in an orderly fashion, so that use of one movement does not cancel out another.

General procedure

When you use camera movements, the first essential is a really substantial and

rigid tripod which can be locked solidly wherever it is set. Even if the camera is reasonably balanced to start with, it is very easy while setting the movements to make it unstable without really noticing.

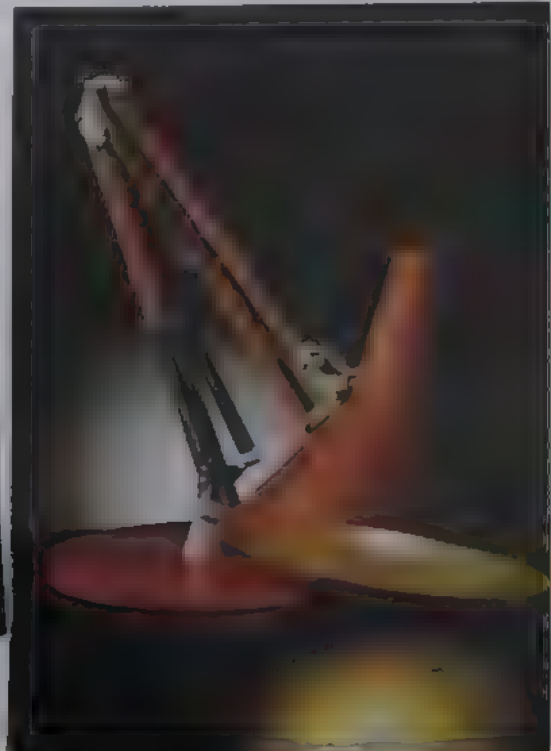
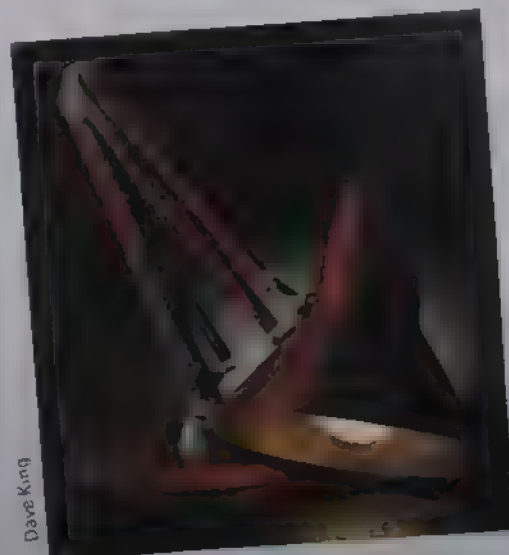
In addition, careful leveling of the camera and zeroing of all movements before use is very important, otherwise it is all too easy to set up one of the movements only to find that your efforts are worthless because another movement was not at zero.

As with the basic manipulation of the large format camera, the most important thing is to work in a disciplined, check-list manner. The first thing to do is to consider the effect you want, and the second is to work out how to get it. This may sound obvious, but almost all newcomers to camera movements fail to do it and waste time fiddling aimlessly with

the movements.

Although there may be times when it is appropriate to work in different sequences, the simplest thing to do is to run through each of the options in turn. First, ask yourself if you need front shifts. If so, can you get them simply by using the camera's shift movement, or will you need to resort to the 'X' and 'Y' tracks described earlier? Secondly, ask the same questions about front swings and tilts—and remember that if necessary you can augment them by using the back movements and then moving the whole camera. Finally, repeat the process for the back swings and tilts. Once you are used to this approach you will find that each time you use the camera it becomes easier. Although the procedure seems tedious and complex at first, it soon becomes a natural part of taking photographs.

Swing depth The swing movement is similar to tilt (see above) but in a different plane. In this shot, the arm of the lamp goes out of focus (left). Using swing makes the plane of focus parallel with the arm so that it is sharp throughout (right)



Dave King

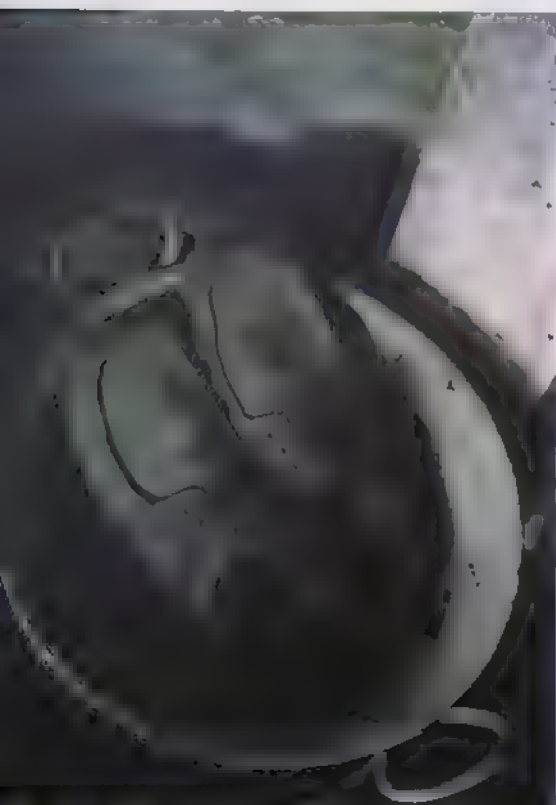
Assignment

COUNTRY GARDEN

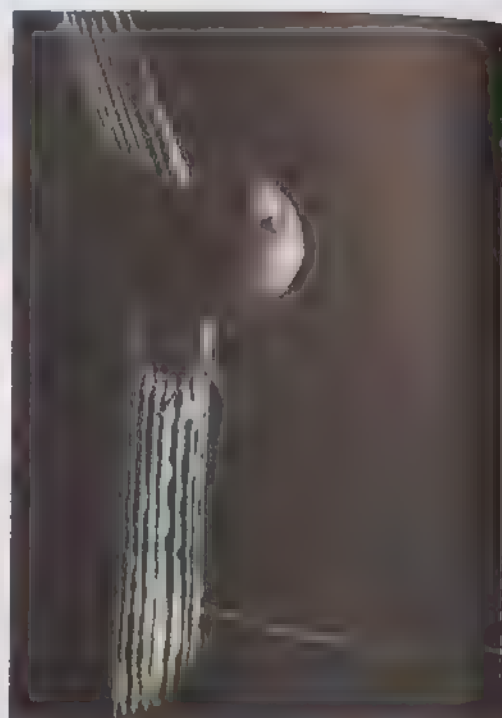
George Wright shows how, with patience and imagination, beautiful photos can be taken in the quietest country garden

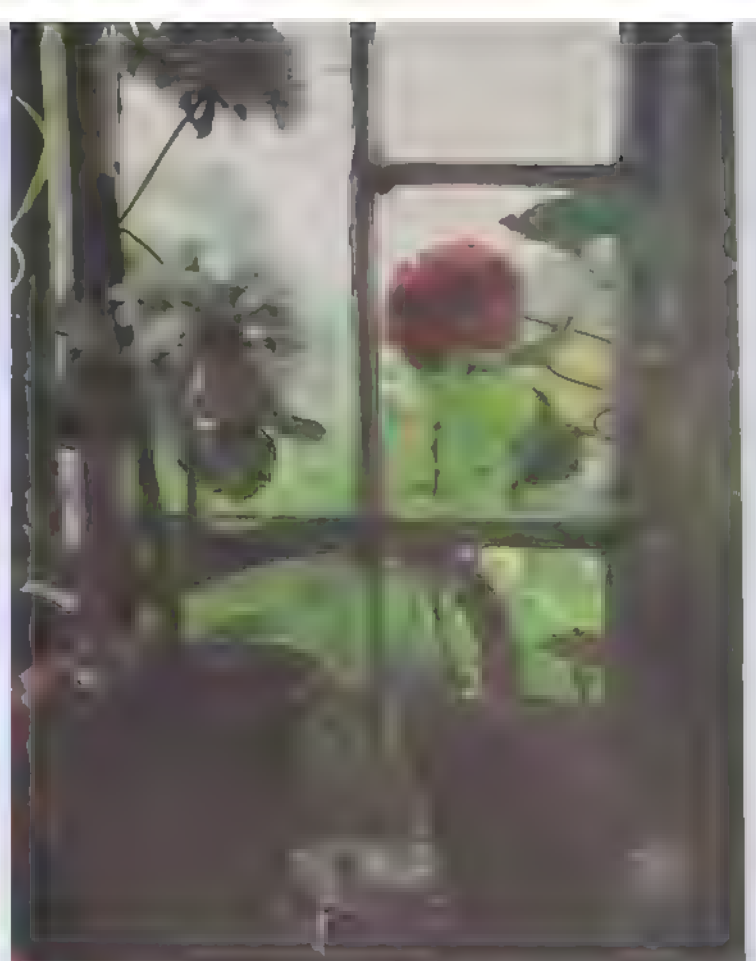


Proud owners This was one of the few times when George was glad to have bright sunlight to liven up the scene. 28 mm lens, 81A and polarizer. Kodachrome 64



Old shoes For maximum sharpness George used Kodachrome 25 and a 55 mm macro lens. 4 seconds at f/32. **Gnome** The ladybird and gnome made an unusual subject. 55 macro, 1/125 second at f/16. **Snail** Slight underexposure added drama. 105 mm lens with PK-11 and PK-12 tubes. 1/2 second at f/11 with 'a little burst of flash'. **Lily** For this close-up, George used his 105 mm lens with a PK-11 extension tube.

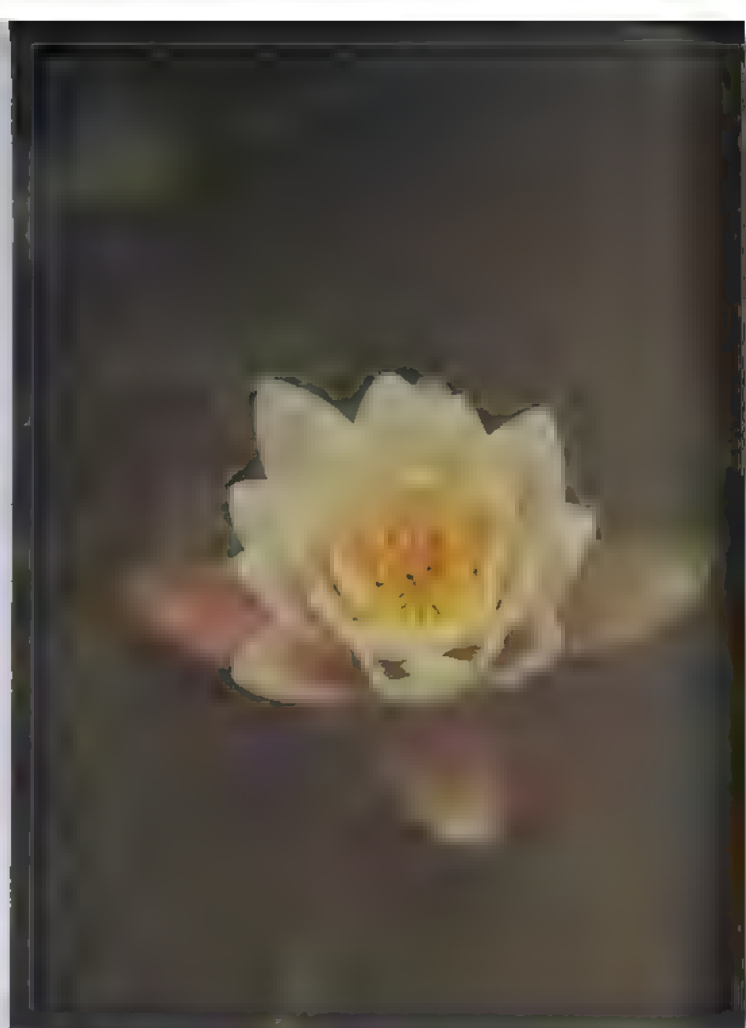


[illegible]

Assignment

from the others. The pictures here also show that in a garden there is far more to photograph than just plants—a wheelbarrow, a pair of shoes or a garden hose make good subjects. The test was to photograph the garden without the main subject. George calls the assignment "a test of plants and the photographer's ability to see beyond the obvious."

Shooting a water lily
For this shot, the Nikon F3 was mounted on the inverted tripod column for the low viewpoint. A reflector added light needed while an 82A (pale blue) filter made the colour cooler. A polarizer reduced reflections



Pea pod To provide diffused back-lighting and an uncluttered background, George suspended a sheet of tracing paper behind the subject and used a reflector to bounce light back on to the front of the subject. For this set-up a 300 mm lens was used together with three extension tubes, 81A and polarizing filters

shutter speed is 1/125 sec and a 1/125 sec shutter speed is required for close-up work. The demands very often are not satisfactory. George had to wait until the wind died down. Added to this problem is the difficulty of focusing on close-up with a reflex spot image focusing screen. For this assignment George preferred the E screen to his Nikon F3. Nikon's E screen made focusing easy, but the reflex image also allowed careful composition and enabled him to see whether a subject was moving by comparing it to the vertical upright lines marked on the screen.



George Wright

What went wrong?

Silhouettes

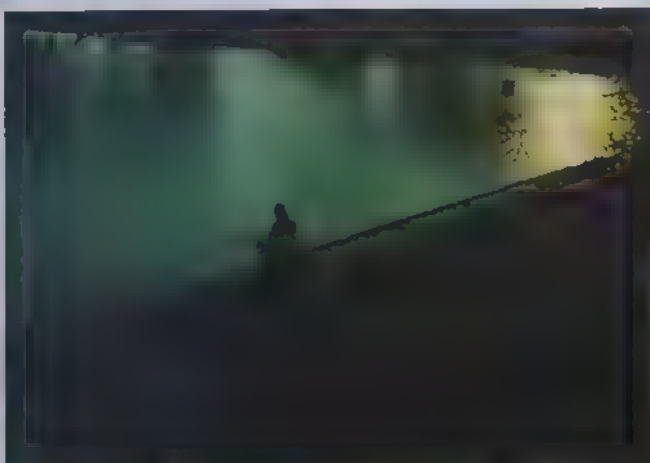
The silhouette is a useful device in photographs, since it can create strong graphic effects. Colin Molyneux gives his opinions on four attractive shots.



This photograph looks like everybody's dream location—palm trees, sunset and sea—difficult to see how anyone could go wrong. But there is one very obvious fault with this picture—the bottoms of the tree trunks are far too close to the edge of the frame. They need a little more space under them to prevent the subject seeming to fall out of the bottom of the picture. A slight change of camera angle downwards would have corrected this fault, or if the photographer wanted to include the small cloud at the top of the picture, then a few steps backwards would have had the same effect. On reflection, I would have shot with a telephoto lens from further back to keep the relationship of the headland and trees the same but to make the palms fill the frame more. This would also have put more emphasis on the sky and the clouds on the horizon.



This scene cries out for a vertical format. The fantastic sky which is the most interesting element in the picture should have been the dominant feature. As it is, the horizontal shape chosen by the photographer has not made the most of the sky or the silhouette of the chimney. In a scene like this where the background is the important feature the foreground should be kept as simple and as graphic as possible, to complement and not distract from the main subject. I would have framed this shot as an upright and cropped so that the chimney occupied the bottom third or so of the frame with just a fraction of sky showing on either side of it. This would have produced a strong vertical feeling to the picture and put much more emphasis on the sky where it belongs. It would also have removed the unsightly TV aerials from the lower left of the frame.



Everything in this picture is just too far away, with too large an area of little interest. Much more impact could have been achieved if the photographer had been more selective over the viewpoint, moving in much closer so that the man and his rod were the dominant features in the frame. An angle that positioned the fisherman so that an area of sunlit water was directly behind him would have been ideal, and if the photographer would have included part of the sunlit path as a diagonal from bottom left to top right so much the better. Many photographers make the mistake of standing too far from the subject and leaving uninteresting, unimportant and often distracting detail in the frame. For impact get in close—or if you want a wide shot then make sure there is something in the foreground to give the picture depth.



Without being able to see what lies off to the left of this picture it is a little difficult to criticize it constructively, but bearing this in mind I think the composition could have been improved in two ways. First, I would have chosen a higher viewpoint and at the same time dropped the right hand side of the foreground so that it started in the right lower corner of the frame thus making the line of reeds a more definite diagonal. Second, positioning the building on the right side of the picture, combined with the more pronounced diagonal, would have resulted in a more balanced composition. These changes would have made more of a feature of the water and the building's reflection, and would also have prevented the tips of the reeds on the left from merging into the building, placing them against a lighter background for better separation.





The INDUSTRIAL SCENE

Creative approach

For many people, industry is ugly and unphotogenic, but, for the creative photographer, the motley colours, textures and shapes of the industrial scene—and the activity—can provide subjects far more fascinating than any rural vista

So many people live in urban settings that the industrial skyline has become their everyday landscape. The power stations, warehouses, refineries and factories are more common sights than rolling hills, mountains or forests. But this is not to say that as photographic subjects industrial areas have less potential than farmland, picturesque villages or the coast. There is, in fact, almost unlimited creative potential in the wide range of features that make up the industrial scene.

With a subject so vast and widespread, a lot of thought has to be given to deciding what particular areas to concentrate upon and how to treat them creatively. For most people who photograph the areas where products are mined, manufactured or processed, shots have to be taken from a relatively distant point of view. Only if you are a professional industrial photographer or you actually work in industry are you

Cooling towers *The mood of an industrial scene is mainly determined by the light—early morning or late afternoon is particularly effective*

able to be at the scene, to take a shot that is not just a photograph but a piece of art. The industrial scene has a creative potential that the rural landscape can be expected to lack, actually having to get behind the scenes.

Choosing either a theme or a specific location is the most likely way of producing strong pictures. One of the most frequent industrial themes in photography is the way that the means of production dominates the environment and the people living in it. Approaching the subject from this point of view entails relating the industrial buildings and processes to the surroundings. But it is important to distinguish between placing a scene in its social or environmental context and producing a cluttered shot in

which the surroundings distract the viewer's attention.

Long lenses are useful for relating the industrial scene to the surrounding landscape. A photograph of a power station with its enormous cooling towers could be taken from a distance across a stretch of rooftops to relate the towers to the consumers. The telephoto effect would draw everything close together in the frame emphasizing the proximity of industrial complexes to the residential areas. In an area surrounded by unspoiled countryside, a river or patches of green fields could be placed in the foreground with an industrial monolith rising up in the background. This kind of shot can often highlight very effectively the way modern man's mark has been imposed upon the landscape.

This relationship, between industry and the surroundings is an important concept to bear in mind and there are

ways of pursuing
The pit he
uld be pl.
that it looms a
miners houses
be able to find
f the re

with the familiar urban skyline
the background

These long range shots
not always have to be
two contrasting areas
Photographing an industrial scene
from a distance is a good way to
produce a sense of scale and
show the overall layout of the site.
The use of a long telephoto lens
is particularly useful for capturing
shots of smoking chimneys and
polluted air hanging over the
site. The use of a long telephoto lens
light as much as possible to make
them more visible. The use of a long
at early morning or late afternoon
greatly improve the quality of the
effective way of making a dramatic
picture out of industrial scenes. To
shoot at a distance either use the
dramatic lighting of the sky as a back
ground or shoot with a long telephoto
lens to capture the details of the
buildings and structures in the
foreground. So that the sky and
and ground are both visible in the
landscape. A long telephoto lens
skyline which gives a sense of
fascinating details. A few other
can be used to capture the details of

Alternatively you could wait until
the sun has set and photograph an
industrial plant with its artificial lights
adding to the dramatic effect.

Grey flat roofs and streets appear far
more picturesque after a fall of rain
particularly if the sun breaks through the
clouds. The contrast between the wet
surfaces and the sky will give a dramatic
effect which will add to the overall
flat. The bright sun will make it
difficult to get a good exposure—so
exposure—so use a neutral grey tone and
from that before composing your shot.
Under such weather conditions you may
also find that the sky above is dark and
forbidding while rays of sunlight are
playing on the buildings and roads or
white smoke rising in to the sky. These
are almost ideal conditions for
photographing the industrial scene and
are more likely to produce atmospheric
pictures than a blue sky and bright
sunshine.

Even without special permission
there are many ways of getting more
detailed photographs of industry. The
social aspects are relatively accessible
—people on their way to work, lines of
unemployed workers queuing for jobs,
children playing in grimy narrow streets
or even photographs of a housing estate
built to accommodate the work force.
However, it is also possible to get close
enough to some industrial sites to be
able to use a short telephoto lens to close



Hands at work If you have the opportunity
to photograph people at work, do not forget
to look for close-up shots.

Refinery at night An early evening sky can
make a colourful background for industrial
scenes—especially if there is also artificial
lighting to provide colour contrast and to
illuminate the foreground. **Polluted skyline**
The smoggy clouds that often hang above
industrial complexes make very dramatic
photographs and highlight the less
pleasant aspect of industry. **Woman at work**
Black and white film is well suited to
photographs of people at work and creates
a timeless quality—subjects like this can
provide a whole series of shots

in on details of refinery pipes, stockpiles
of materials or finished goods. With shots
like this it is less easy to relate the
subject to its surroundings so it is often
more effective to concentrate on isolating
patterns or interesting details. Whether the
subject you choose is the
work of a petrochemical plant, all
compressed together with a telephoto,
or chimney stacks or lines of finished
motorcars, the best policy is to keep
your compositions simple and to con-
centrate up on the shapes you see. The
viewfinder paying special attention to
the background and the surroundings to
avoid distractions. Industrial sites,
particularly the old and well established
ones such as steel works and coal mines,
tend to be a jumble of stockyards and a
variety of buildings, which make these
locations particularly confusing to deal
with at closer range.

A problem with more detailed shots is

Pat Wood/Tony Stone Photo Library







Cityscape Tightly packed roof tops often provide good subject matter, especially when picked out by a telephoto lens. Try shooting after a fall of rain when the shining rooftops give a scene more contrast. **Shafts of light** A workshop floor looks particularly atmospheric when there is daylight falling through the windows—the more common overhead light sources tends to make an interior look too flat. **Nodding donkey** The distinct shapes of oil pumping apparatus respond well to backlighting so that they are reduced to simple silhouettes. **Alaska pipeline** A polarizer enriched the colours and made this outdoor work look more attractive. Underexposure by about a stop—occasionally two—can often help to saturate colours even further

the scene. The lighting is dramatic, with strong highlights and deep shadows, creating a sense of depth and texture. The background is dark, making the illuminated objects stand out. The overall effect is one of a well-lit, professional photograph that captures the essence of the workshop environment.

If you are looking for a more dramatic effect, you can try underexposing the image by about a stop or two. This will help to saturate the colors and make the scene look more atmospheric.

Photo: [Name]

The photograph is a well-lit, professional shot of a workshop floor. The lighting is dramatic, with strong highlights and deep shadows, creating a sense of depth and texture. The background is dark, making the illuminated objects stand out. The overall effect is one of a well-lit, professional photograph that captures the essence of the workshop environment.

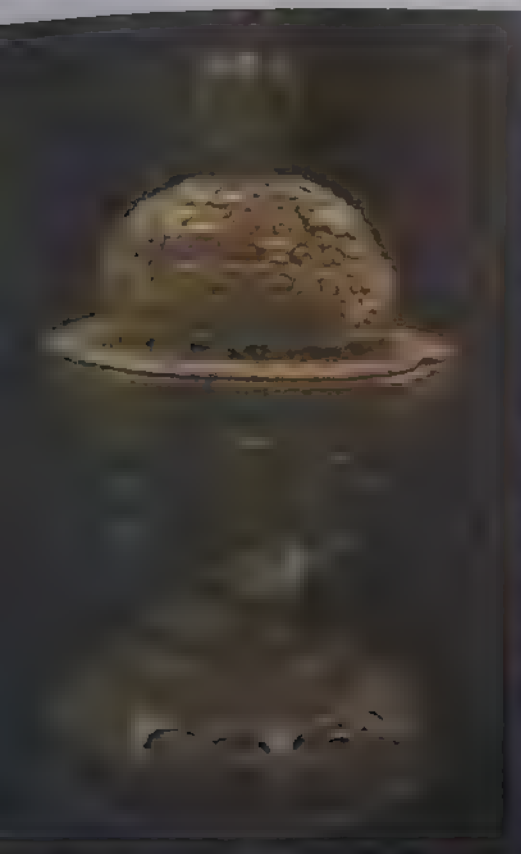
Improve your technique

LOCATION STUDIO

Being on location does not mean that your shots have to be of lower quality.
With the right equipment and a little extra care over backgrounds and lighting,
you can get results indistinguishable from those taken in a studio.



between a photo
and one taken on location



Intense shots These shots were taken on location in Tibet using tent lighting. The Guru (left) was lit with available window light plus reflectors. The skull bowl (above) suffers from lack of depth of field as small flashguns were used



the light meter, and the camera's light meter. The camera's light meter is more accurate than the light meter, but it is not as accurate as the light meter.

The camera and accessories

Any camera can be used for photography. The only thing you need is a camera that will accept the camera's light meter. The camera's light meter is more accurate than the light meter, but it is not as accurate as the light meter. The camera's light meter is more accurate than the light meter, but it is not as accurate as the light meter.

The camera's light meter is more accurate than the light meter, but it is not as accurate as the light meter. The camera's light meter is more accurate than the light meter, but it is not as accurate as the light meter. The camera's light meter is more accurate than the light meter, but it is not as accurate as the light meter.

Softer light Quartz lighting is useful but can give hard shadows (left). Putting a diffuser in front of the lamp (below) gives softer lighting (right)



Backgrounds and lighting

Large quantities

The first thing you need is a large quantity of light. The light should be bright enough to fill the room. The light should be bright enough to fill the room. The light should be bright enough to fill the room. The light should be bright enough to fill the room.

The second problem is locally obtained fabrics. This is especially true in India where light cottons and a wide variety of colours are available very cheaply. Double width two metre fabric can be used either as a drape, smooth or gathered to give the effect of drapes. Heavier fabrics can be used in the same way as the black velvet, but a little variety.

Unless the background is important, or



1000 1000

in the subject is if the best approach is wide aperture and selective focus. If the subject is not very clear, it is not very clear. If the subject is very brightly contrasting, the brightness should not be too high.

Lighting is even more of a problem. Ideally, you should work with natural light whenever possible. This is a demand on erratic light, but it is also a heavy, expensive and unreliable source of batteries, but it is also a source of colour, quantity, and direction.

Each of these variables is, however, controllable. The first is the most important if you are using transparency film, as it is the only one that can be corrected with filtration. This is where the colour temperature meter comes in. It can be easily corrected, however, if it is changing quickly, for example at sunset or if it derives from fluorescent tubes as in a museum or other building. Evening light can add character to a shot as it becomes redder, but fluorescent lighting or worse still, fixed lighting, disastrous. A CO2 meter in FLW or FLW (see page 360) may surprise fluorescent lighting, but the results will still be unpredictable and possibly unusable. The only temperature is moving the subject away from the fluorescent light, or away from the light, or adding artificial light, such as a flash.

Indoors it may be possible to increase the amount of light simply by opening curtains and doors. You may increase the lighting by several steps in this way. It may also be possible to change the direction of the light when the sun is changing from a different direction. But if the light is simply coming from the wrong direction, then reflectors are needed.

Reflectors can be as simple as a sheet of newspaper or a piece of white cloth, even a T-shirt will often make a significant difference—or they may be purpose-made. Three of the most useful possibilities for studio photography on location are aluminium foil crumpled and then stretched out before being stuck on a piece of white cloth for packing ease (the crumpling helps prevent hot spots in the reflector light), white fabric stretched over a wire, painted white and (use bought laths or bamboo poles) or wood cut from trees and painted white. Reflectors, such as the Lastolite.

Plain white or textured silver reflectors do not alter the colour of the light—the main difference is that textured silver reflectors are more efficient. Some people use gold coloured reflectors for flattering skin tones.

The plain white reflectors can also be used as diffusers to modify harsh, directional light, a typical diffuser might reflect 50 per cent of the light falling on it and diffuse the other 50 per cent through it. Once again alternatives include large pieces of white cloth. These can be pinned in a window, like curtains. There is also the possibility of using a black Lastolite, or something similar, to shade the subject or to prevent reflections from



Useful accessories Above are the best types of reflector—foil, umbrella and Lastolite (which folds to the size of the small blue bag). The bracket (right) allows you to fit a flashgun to a tripod, for easier and more versatile lighting

nearby surfaces.

There comes a point, however, when there is simply not enough light and reflectors and diffusers are of no use. Very long exposure times should be avoided because of reciprocity failure (see page 466). At this juncture you are forced back on additional lighting. Simple on-camera flash is extremely unlikely to be able to deliver the effects you want, so multiple flash will be needed. An alternative if the power is reliable and if you can totally exclude other light is tungsten lighting, preferably tungsten halogen—with plenty of spare bulbs. But this involves carrying a considerable extra load.

The best form of additional lighting is therefore flash. A good set up will include a large powerful gun, preferably with switchable power, and anything up to half a dozen small guns with slave units. These can be quite inexpensive, costing less than a couple of rolls of transparency film each. With just one extension lead for the big gun, you have a main light source with plenty of fill-in; you can also group the small guns together for greater intensity.

You should make sure if possible that all the guns run on the same size of batteries—the AA pencil-cell size is fairly universal and is easy to carry. An excellent idea is to carry rechargeable (NiCd) batteries, if there is any chance of being able to recharge them. A well-planned expedition will use AA batteries for everything.

To hold small flashguns in place, use



Setting up a tent



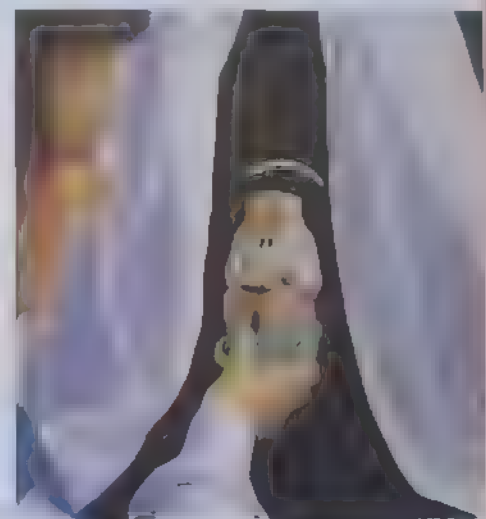
The best material for the frame is thin wood or bamboo which can be either taped or nailed together



Place the object you want to photograph on a suitable background and then cover the frame with white cloth



After setting up the camera, preferably on a tripod, cover the front of the tent with cloth, making a hole for the lens



Use a hand-held meter, rather than the camera's built-in one. The best way of metering is the incident light method



With some types of cloth, especially if it is fairly thick, you will find that the shot has a slight yellow cast

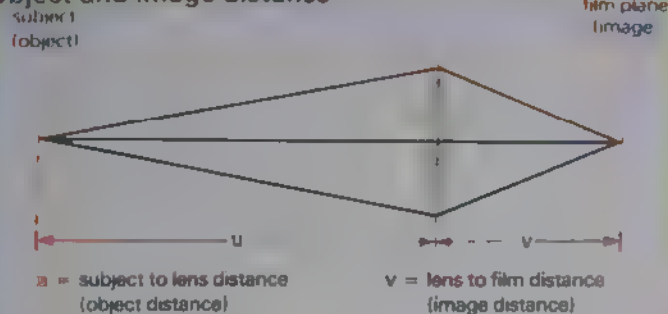


If the light in the tent is too yellow, use an 82 filter to correct. If in doubt, shoot pictures with and without the filter.

Optical calculations-1

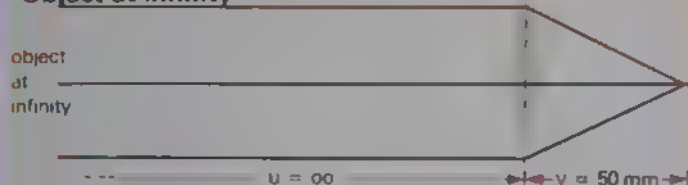
Optical calculations look very complex, but with a pocket calculator you can fairly easily work out the coverage, magnifications and lens extensions essential for close-up work

Object and image distance



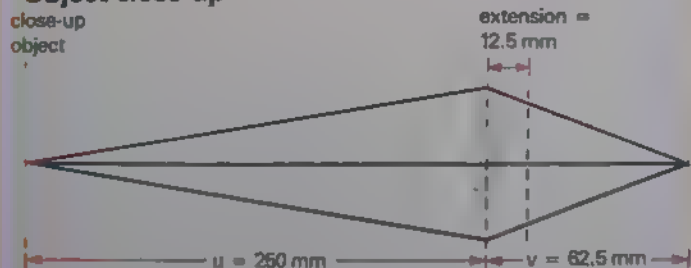
In all optical calculations these two distances, *u* from the subject to the lens and *v* from the lens to the focused image, are crucial

Object at infinity



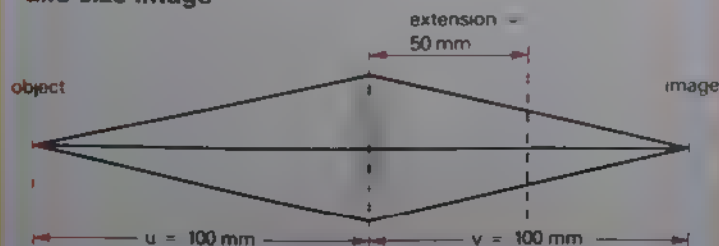
When the object is at infinity, the image is focused close to the lens and the value of *v* is the focal length of the lens

Object close-up



When the object is close-up, the lens must be moved further from the film to keep the image focused and so *v* is extended

Life-size image



For a life-size image, the lens must be moved forward so that both *u* and *v* are equal and twice the focal length of the lens: $m = v = u$

Many people these days have a pocket calculator, whether of the simple four-function type, which simply allows you to add, subtract, multiply and divide; or the scientific type, with trigonometric functions such as *tan* and *sine*, as well as time-saving keys such as *squares* (a number multiplied by itself) and *reciprocals* (one divided by the number)

There are a number of formulae in photography which from time to time may come in useful. Before the advent of the calculator, people either used them only when there was no alternative, consulted tables, or experimented. But it is so easy to use a calculator that it can be quicker to calculate the value you want than to look it up in tables or find it by trial and error. One area that is particularly suited to calculator work is close-up photography.

Most of these calculations can be done using a four-function calculator, but additional features such as a memory for intermediate steps, reciprocals and trigonometric functions can also be useful. The feature of *brackets*, for intermediate steps is also worth having.

There are different methods of keying in a calculation, so it is possible to describe only the formulae used—you must be familiar with the use of your own calculator first. If you find some calculations regularly useful, it might be worth using a programmable device to save time each time you use it.

Most calculators offer far more accuracy than you can use, so simply ignore any decimal places which are surplus. Most of these calculations are fairly straightforward but it is very easy to make a small mistake which upsets all your sums.

So if you are in any doubt, or if you get an unexpected result, check your calculations again.

Image distance

calculating how far from the lens the image will be (*v*) for a given object distance (*u*) with a particular focal length (*f*) of lens is

$$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$$

Rearranging this, remembering that when a term changes sides in such a formula it changes sign, we get

$$\frac{1}{v} = \frac{1}{f} - \frac{1}{u}$$

For most photography, where the object distance is large compared with the focal length, the value of $1/u$ becomes very small indeed, virtually zero. So the image distance is almost the same as the focal length. But suppose we wish to photograph an object just 250 mm away from a standard 50 mm lens—what will the image distance be? In other words, how far from the film must the lens be?

With the values chosen, the image distance turns out to be 62.5 mm. This is 12.5 mm greater than the normal 50 mm lens to film distance, when focusing on infinity. So to be able to focus down to 250 mm, the lens must travel this distance outwards from the film.

With the values chosen, the image distance turns out to be 62.5 mm. This is 12.5 mm greater than the normal 50 mm lens to film distance, when focusing on infinity. So to be able to focus down to 250 mm, the lens must travel this distance outwards from the film.

What will be the magnification on the film of such an object? The magnification is simply the image size divided by the object size, and these are proportional to

their distances from the lens so magnification, m , is given by

$$m = \frac{v}{u}$$

Combining this with the main formula gives

$$v = f(1 + \frac{1}{m}) \text{ and } v = f(1 + m)$$

The terms in brackets have been worked out for this multiplied by f

Field of view

Another problem that might concern you is the coverage of the lens at a given distance, so that you can tell whether or not a given object will fit within the frame area without having to try it and see

The maximum field of view is that across the diagonal of

the object distance of 250

If you want the field of view, W , in degrees, use the equation

$$W = 2 \arctan \left(\frac{k}{2v} \right)$$

The symbol 'tan' is the angle whose tangent is often used in trigonometry and is in degrees. For example, values into the equation gives a value of 47°. When the lens is focused on infinity, so that v becomes the same as f , W has its maximum value of 47°. So the field of view of a lens reduces as it focuses closer

Bear in mind that this calculation only gives the diagonal of the rectangular picture area—the width is much less

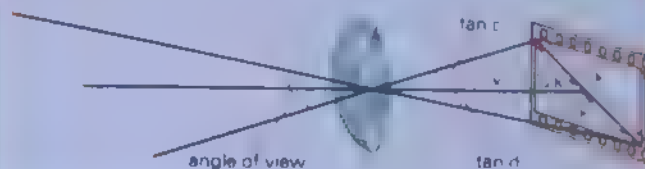
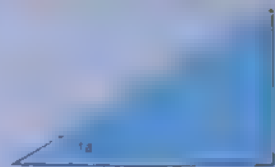
Calculating field of view

1 The diagonal, k , is the

length of the diagonal of the format and breadth q of the format

2 To find the angle of view you must use 'tan'. In any right angle triangle, the tan of an angle is simply the length of the opposite side divided by the adjacent so in the figure $\tan = a/b$

3 The field of view can be thought of as two right angle triangles, so we simply calculate the tan for one and double it. In the figure, the opposite side is half the diagonal of the film format—that is $k/2$. The adjacent side is the distance v . So, $\tan d$, for instance is $k/2v$



So if your exposure meter gives $\frac{1}{4}$ second at $f/8$, the new effective aperture, $N' = 8(1 + 0.25) = 10$, or $f/10$, and $t' = 0.25 (1 + 0.25)^2 = 0.4$ seconds

This rule does not apply to telephoto or retrofocus lenses because, with these the entrance and exit pupils have different diameters. For these you must rely on TTL metering or test shots. Depth of field calculations are covered in the next article



Unless you are lucky enough to own an SLR, you need to make careful calculations to fill the frame with a close-up like this

the frame, k . You can find k from Pythagoras' Theorem, which can be rearranged to give

$$k = \sqrt{p^2 + q^2}$$

p and q being the sides of the 35 mm format.

So for a 24×36 mm format, k is 43.3 mm

The coverage of the lens is in simple proportion to the magnification, so a distance of 43.3 mm on the film becomes a measurement of k $m = 43.3/0.25 = 173.2$ mm at

Exposure correction

When you are using an extension tube, the effective f -number and the exposure time change. Where the original lens aperture is N , the new effective aperture is N' , called 'N-dash'. Then:

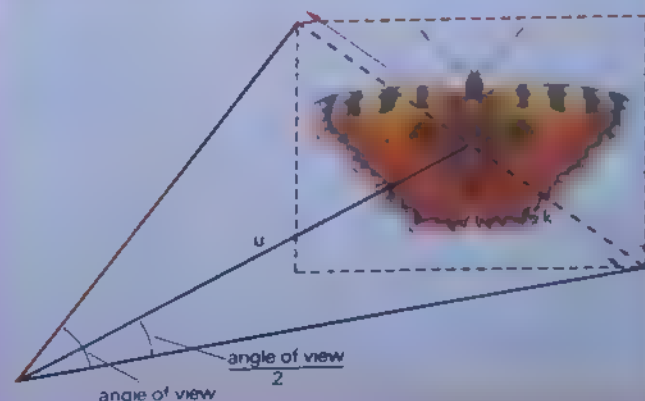
$$N' = N(1 + m)$$

and the new exposure time, t' , is given by:

$$t' = t(1 + m)^2$$

where t is the original exposure time.

Filling the frame



Once you know the angle of view, you can work out at what distance the object will fill the frame simply by dividing the diagonal of the object by the tan of the angle of view

Tessa Traeger

With her unique and creative approach to food photography, the British photographer Tessa Traeger has shown that craft can be combined with photography in a fresh and original way

Few photographers have such a distinctive and easily recognizable style as Tessa Traeger, with her personal approach to food photography. Her skill lies not only in her photographic technique, but also the way she can create wonderful collages with the food or construct atmospheric backgrounds. It is quite normal for her to transform a pile of fresh fruit and vegetables into an expressive face or a delicate pattern, or create a detailed, evocative setting in her own studio.

Nowadays most of Traeger's work is in advertising, particularly at home in Britain and in France, but she also does a fair amount of editorial photography as well as personal projects such as books. Although she began her photographic career doing still lifes and general editorial work, food collages have now become Tessa Traeger's signature. But she did not develop this approach until 1975 when *Vogue* magazine asked her to do their food series.

'I decided I had to come up with some new solutions. Food photography at that time was the most massive cliché—it was always exactly the same—always backlit, covered in glycerine and done on 10 x 8.'

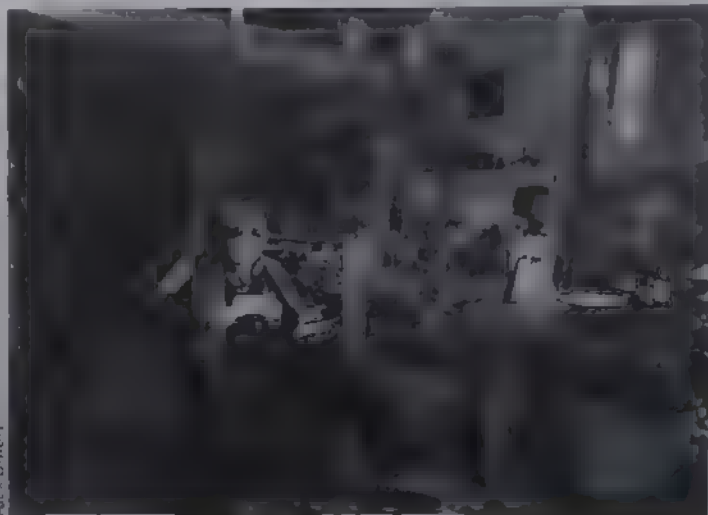
'One alternative that I chose was doing collages and the other was to construct special backgrounds for the food. It's very hard to do food photography on location. It requires going to a lot of

expense and trouble. You've got to order all the food and then take it, pay for it and then get yourself the cook and the food there. It's a fantastic production. It's much easier to do it in your own studio. But then, of course, it's boring to do it time after time on a table top. So I compromised and decided to build little sets with background pictures and other props, so that I could tell a story in my own studio.'

Many of Tessa Traeger's pictures have a rather 19th century look. 'People often say, "Why don't you do more modern pictures?" But, you see, food isn't very

modern on the whole. If you're trying to separate the look of Russian food from that of Italian, the best thing you can do is use the old, traditional objects that you associate with those countries. That's why a modern approach to food picture is so difficult—it can so easily look characterless and dull.'

Traeger frequently uses wonderfully evocative Victorian advertising posters in her studio sets. 'My great uncle died at around the time I was starting the *Vogue* work and he had an attic full of 19th century posters and backgrounds, for Pears soap, in particular. I leapt on them



Strawberry border photographed at Traeger's Devon studio for a 'Summer and Winter Cookbook'

Tessa Traeger checks a Polaroid at the Rossetti Studios—her London base

Banquet Created for a poster campaign for Bowyers to reinforce their traditional image. The byline read 'English families have been eating them for centuries'



facturer. This kind of misperception, Traeger says, is not work. When her imitators produce poor results, some people may mistakenly believe that the failures are Tessa Traeger's.

However, she acknowledges that everyone is inspired by other people's work. "If I look at it positively, to be copied is the ultimate compliment," Traeger herself drew much of her own inspiration from the Italian painter Arcimboldo—particularly a series of paintings where fruit and other objects were arranged in the shape of people's faces.

"There's quite a tradition in painting and other arts of making up figures from other objects." Nevertheless there is no doubt that Traeger's work is extremely original.

Tessa Traeger is luckier than most—her favourite assignment comes up once a month when she collaborates with her

friend, writer Arabella Boxer, on the *Summer and Winter* series. This consists of an article and a complementary painting. They choose the subjects together, both together and apart. "People have many different interests," she says. "They start with a strong visual idea, sometimes from an abstract concept. We are so fortunate to have people to work with and live in a city that is so rich with what we like. We have a lot of things to choose from. I know what they need and what the readers like. So I would never do something unsuitable or inappropriate, but at the same time we enjoy ourselves immensely."

Whatever Arabella and I do seems to

Summer and Winter A reversible image made from fruit and vegetables to represent each season—taken for a book based on the *Vogue* food series that Traeger does with Arabella Boxer and is called *The Summer and Winter Cookbook*.



Tessa Traeger



Sheaf of pasta composed for a booklet of recipes based around the four seasons and produced as a promotion for a French company which manufactures pasta

La Petite Auberge
Jean-Luc Barnabet in his restaurant at Vaux, photographed for a 'Sunday Times' article about 'Three star meals for one star prices'. Traeger used a Mamiya RB67 and a flash
Take-away food
Terry Stratton painted the paper cloth with bright splashes of colour and Traeger decorated it with disposable cutlery and plates to show the delights of cheap and cheerful eating





Bowl of fruit Taken for a *Vogue* food feature about cooking with citrus fruit. The art of arrangement is often crucial to the success of a photograph.

work outside the studio, partly for the *Sunday Times* and partly for *Vogue*. I'm doing a series on the opera for *Vogue* at the moment and I did an album book binding before that. I've also quite a few stories for the *Sunday T* which include straightforward portraits.

One of these stories, which involved photographing French chefs at work in their kitchens, she rates as her second most favourite assignment. In human terms it was a marvellous experience as they're all people who are very good at what they do. Once they started to appreciate that we were fellow professionals, things went smoothly. At first they were a bit resistant to a photographer being in the kitchen while they were doing their job. But I learnt to keep on the side and take pictures without interfering with the flow of work.

'They were all family restaurants—one star French country restaurants—and there's an amazing tradition of excellence, which, I'm sorry to say, doesn't exist in Britain. We learnt a great deal about food—new ways of presenting it and of thinking about it.'

Tessa Traeger's equipment reflects the varied kinds of work she does. She has three different formats of camera and hires others when she needs them. Much

Telephone ordering

This giant collage was photographed for a 48 sheet poster to publicize a mail order food company in the Paris Metro.



They're very good. I fix them and use them to print from."

She always has one full time assistant and many other people who work with her on

books.

cook for me, a

list and, of course I have my

rek Harman in London and

n Varga in Paris. When we get very

we have a second assistant in

ally speaking, these are my old

stants. Once, last Christmas,

when we had a very big job on, there

were five assistants in Paris and

all working here. It was great fun."

As well as building up an extensive

library of photographs, both from trips

abroad and work in England, Tessa

Traeger has held several exhibitions of

her work and some of her photographs

are now in public collections.

"I'm quite proud of the fact that while

carrying out my work as a professional

photographer I come up with images which actually end up in national museums. For instance after my show in Paris the Bibliothèque Nationale asked me to present a collection of my work for the French National Archives.

Traeger's attitude to photography is direct and realistic. "I don't think it matters what you're doing it for, it's the quality of the end product which counts. You can do your masterpieces for an advertisement, for a magazine or for yourself—all that's good. People who

photograph very often do better to simply do your best in 30 years time decides if you know you've done well."

For the moment, then, Traeger is content to remain a photographer. Artistic acclaim can wait. But there is no doubt that her reputation as a photographer will long outlast the wonderful creations that it depends upon.

Botticelli's Primavera constructed from entirely edible ingredients for an article on health and beauty for 'Vogue'. Food colouring was painted on a marzipan face

Cooking with lamb Traeger used one of her uncle's old posters for the background but had to be careful that the lambs in the picture did not appear too lifelike

of her still life work is done on a 5 x 4 she has had since she was a student. "It's an old MPP press camera and I just like it! I use it a lot in daylight and it's very stable. Since I do a lot of flat copy work with long exposures, having a camera which fits steadily on the tripod and doesn't waver around is very, very important." She attaches the camera to a balcony in her studio and works from there, with the collages immediately below on a large, white Formica table.

She also has a 35 mm Nikon which she has had for years. "I'm very happy and comfortable with it"—and a more recently acquired 6 x 7 Mamiya that she uses for portraits. On many assignments she will use all three formats, and she may work in 10 x 8 occasionally when the printing process demands a large negative.

With all these formats, Traeger uses a variety of film. "With the Nikon I use Ektachrome 64, and with the 5 x 4 I use daylight or tungsten Ektachrome converted to daylight. I also shoot colour negative film for prints because when I come to do colour prints it's a tremendous help if you've taken a negative at the time. Then you don't have to have an interneg made and you get a print that's 10 times better."

Polaroids are an important working tool. "The sort of work I do is quite like drawing, and Polaroids to me are quite like sketches of work in progress. They are desperately important. I've got to be able to see what I'm doing, look at it and decide whether it's working or not. I use both colour and black and white. In fact, I use the black and white negatives too."



Tessa Traeger

Filters for effect

There is an enormous variety of 'special effects' filters on the market. Some are very effective and easy to use; others are little more than novelty items. Just what can you get for your money?



Equipment photographed by Roger Payling/courtesy of Photopix & Introphoto Ltd

Most amateurs are familiar with the use of filters to modify a light source or to achieve faithful rendition of colours. Also intended for the amateur market are filters for special effects, ranging in complexity from simple coloration through selective magnification to distortion of the image. Before you attempt to use these, it is best to know what effect they give and how easily it is achieved.

Special effects filters are available separately or in kits, and vary in price according to the construction. In the Cokin range, for example, a coloured diffuser costs less than a plastic lens cap, and a 'diffraction universe' costs about the same as a 36 exposure roll of Kodachrome. For about four times as much you can buy a Hoyarex starter kit, complete with Hoya filters and acces-

sories for attaching them to the camera lens.

The basis of the various special effects filter systems is a filter holder, which is attached to the camera lens by an adapter ring that screws into the filter thread. A range of adapters is supplied with some filter systems, but with others you must ensure you buy the correct adapter for your lens.

Filters are slotted into the holder in grooves, which vary in distance from the front of the lens. Filters from one system will not fit into a holder from another system, so it is a good idea to decide on one make only.

Some filters are no more than a shape cut out of black cardboard to form a mask. You can make these simply, to your own design, but the effect is

Filter kits include a range of basic filters and accessories—some of which are not strictly necessary

probably not worth the effort. Most special effect filters are outside the scope of the do-it-yourself enthusiast, but you can appreciate the effects better by studying how the filters work.

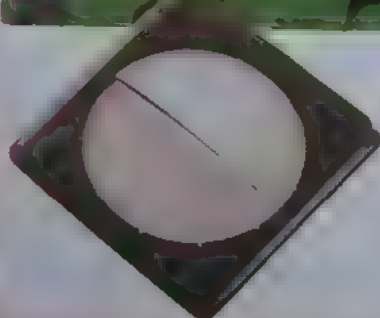
Probably the most sophisticated filters work by diffraction. These are gratings made from high quality optical glass ruled with parallel lines in one or more directions—they give a star or coloured spot effect. Easily the most creative filters are the Coloured Vaseline and Coloured Varnishes, with which a wide range of coloured effects can be achieved. But they can be a little difficult to handle.



The rainbow effect is most prominent when this type of subject (a bright sky and reflective water surface) is underexposed. At the correct exposure, the rainbow is 'washed out'. In a real rainbow, the colours occur in the reverse order



Spot in violet Essentially this is a diffuser with a clear central spot. There is a choice of several different colours, and the filter can be combined with others, such as a starburst. Focusing through the filter can be a problem



A split field filter is merely half a lens in a mount, used as a close-up lens for half the field of view. The edge of the lens causes blurring, and the non-uniform magnification causes distortion, as can be seen in the upper shot



Coloured diffuser This is supplied as two squares of crumpled plastic, which vary in colour according to the angle of view you use. Shown above are shots with and without the filter



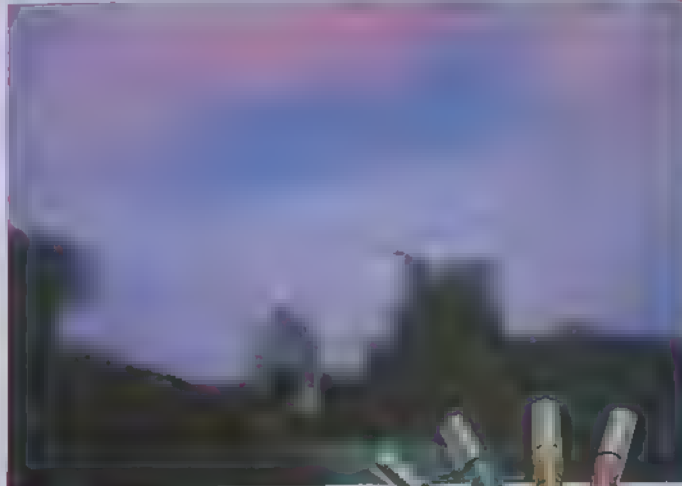
Spot in plain diffuser This is particularly suitable for combining with coloured filters of various densities



Dreams The effect varies enormously according to the aperture used and the filter to lens distance



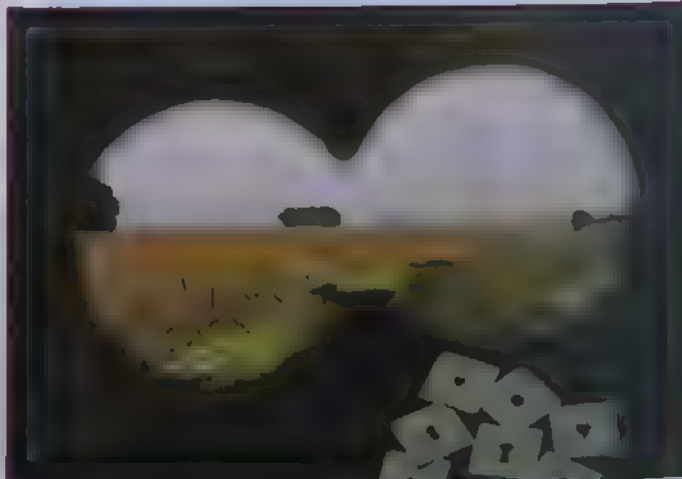
Diffraction universe These are plain in appearance, but are in fact extremely fine gratings of various designs



Coloured varnish, smeared on to glass, gives a varied effect. Here it is used to tint the night sky



Starburst filters for point light sources—available for two, four, eight or 16 rays



Masks come in a variety of shapes, but you can easily make them yourself



Diffuser This gives a soft focus effect, the degree of which depends on the grade of the filter



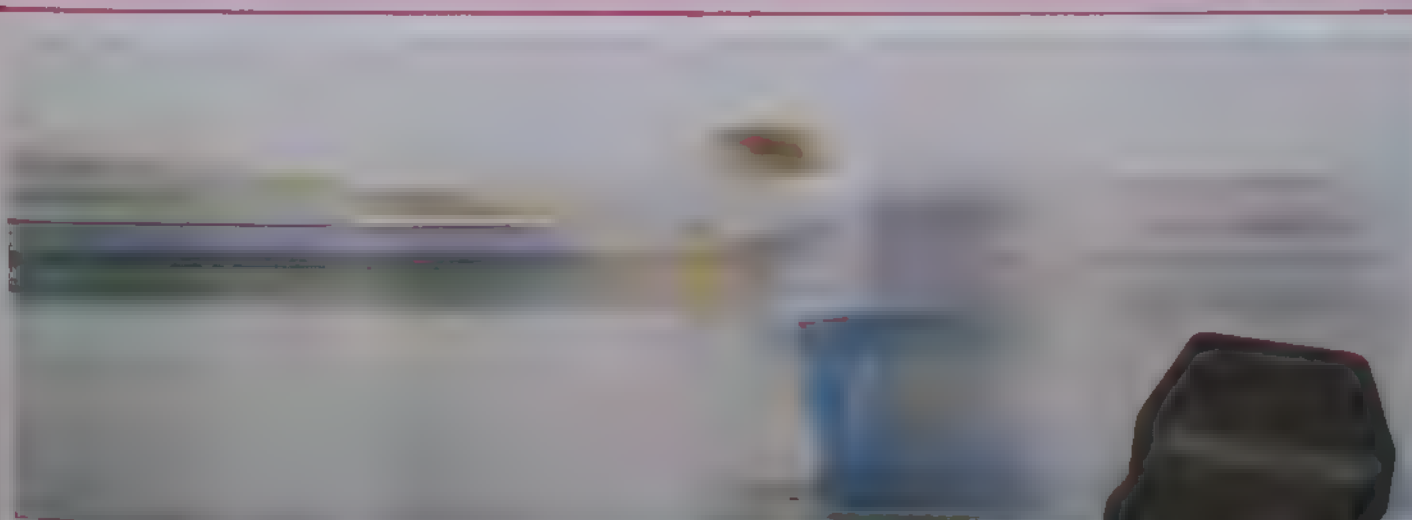
A graduated diffuser leaves part of the image sharp, so it is easily combined with other coloured filters



Coloured vaseline, smeared on to glass, allows you to filter areas of the picture just as you wish



Fog filters are similar to diffusers. Their effect varies according to the density of the coating on each filter



Linear slit This is probably the most difficult filter to use (see page 1400) but the easiest to make yourself. Results depend on how smoothly you wind the film

Half tone screens

The principles of half-tone screening are employed in every sphere of publishing for reproducing photographs in print. You can do the same—and make your own screens—to produce low cost 'camera-ready artwork'

Half-tone screening is the process of converting the continuous tones of varying darkness in a photograph into a series of dots, which enables it to be reproduced in a mechanical printing process. The dots, in the printed image, are of varying sizes, and are reproduced by dots. This is a technique familiar to anyone who has ever looked at illustrations in a newspaper. The dots are formed by copying the original through, and in contact with, a special screen which converts the light and dark tones of the original into a series of uniform black dots. The results can then be used to produce screened positives.

Although used principally in publishing and graphic arts, half-tone screening is a valuable and versatile technique which has many practical uses. For instance, you can prepare a photograph for publication by a newspaper or group. Ordinary photographs reproduced in this way appear very different, with mid-tones, and the way the image is reproduced is very different from the original. Unlike the original, the image is not office copy, but by a different process.

Instant printing Half-tone screening enables a photograph to be used even in low cost newsletters and circulars



Tessa Musgrave



Geoff Wink

Screen sizes 1A, B and C are screenings of 26, 33 and 52 dots per cm. 2A, B and C are the same pictures reproduced on instant print showing varying dot size

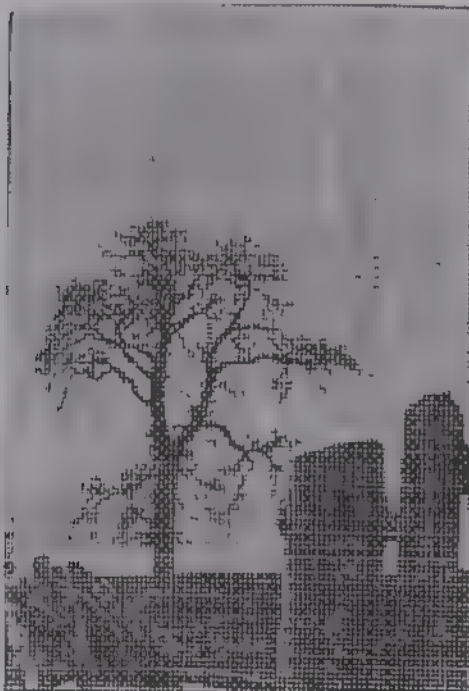
copy photograph of the original print or slide, the image can be shot dot for dot to reproduce the all-important mid-tones.

From a creative point of view, screened photographs have an obvious graphic quality with exactly the same attributes and limitations of print texture. Screening (see page 1236) is a technique you work to a screened film image rather than print image. In addition, the dots are vignettted rather than of constant density.

Screen choice

A half-tone screen is a 'photographic image of, usually, a mesh of parallel lines ruled at right angles—but other screen patterns are available for special effects and some of these are shown here. Thus a screen is usually described by its function—'half-tone' and 'mezzotint' describes two effects—and, where relevant, by its screen ruling, the number of lines or dots in each centimetre or inch.

It is important to choose the proper



Geoff Winkley



Screen choice A variety of commercially available screens, all enlarged from the original scale (approximately 39 dots/cm)

ruling for a particular job. A coarse screen which yields a pattern of large dots may be needed if the image is being reproduced on rough or absorbent paper—or if you want a coarse effect. A fine screen, which gives an image composed of many more small dots, is better for reproducing detail and subtle tone—but must be properly printed, on good quality paper, or the print will be blotchy.

Newspapers make use of half-tone screens with a ruling of 85 lines per inch/33 lines per centimetre (written here in the style 85/33), but 100/39 is sometimes used. Magazine and books use 120/47, 133/52 or finer rulings. A typical range of rulings is 55/21, 65/26, 85/33, 100/39, 120/47, 133/52 and 150/59. These are available in many sizes, some as small as 25 x 20 cm but often much larger. These screens are not normally available through photo dealers, but can be obtained from specialist graphic arts suppliers. Even at the smallest size, reckon on paying the equivalent cost of a box of 100 sheets A4 b & w paper.

If you are producing images to be reproduced dot for dot on, for instance, an instant print machine, choose a fairly coarse screen—85/33 or 100/39 should

prove adequate as there is an inevitable loss of quality. The finest dots tend to disappear whereas dense areas tend to fill in. To prevent this, larger dots should be present on the first print so that, after reproduction—with its inherent increase of contrast—the image will appear correct. If the subsequent dot for dot reproduction is to be by conventional litho, you could use a 120/47 screen.

Another factor to influence your choice of screen ruling is whether or not the screened print you are producing is to be reproduced dot for dot at the same size. It is common to make originals like artwork somewhat larger than the size they are to be reproduced—in some cases simply for the artist's convenience, in others to help conceal very minor working flaws such as retouching. If the screened photograph you are producing is to be incorporated within artwork which is, for example, half as large again as the intended reproduction size (commonly referred to as 'half up'), and you intend to have a final screen size of about 100/39, you should start with the coarser 65/26 screen.

And this applies equally to the final screened print. If the screened copy negative made from the original is

enlarged or reduced—that is, printed using an enlarger rather than by contact—the screen size of the final image may in effect be very different from that actually used.

If you are having your work reproduced by conventional litho printing, it would be a good idea to get the printer to 'strip in'—combine—your screened negative with the line negative of the type and artwork. You would then only need a screen to match the desired dot ruling size on reproduction, and you would not have to make a positive screened print.

Screens have either grey or magenta dots. Both are suitable for black and white originals but only grey dot screens can be used also with colour. However, the magenta type of screen offers improved sharpness and fine detail, better tone rendering and—by use of an appropriate filter—one additional method of image contrast control.

As a final alternative, consider using Kodalith Autoscreen. This is a high contrast orthochromatic film which incorporates a half-tone screen pattern of 133/52 ruling. Half-tone negatives or positives can be prepared by contact printing—or directly in the camera—without the use of a conventional screen. Available in boxes of 25 sheets, in sizes 203 x 254 cm and 279 x 356, Autoscreen costs three to four times as much as similarly-sized colour paper.

Using screens

It is useful to look at how screened images are produced professionally to spotlight the restrictions and problem areas which occur in amateur working. The trade uses a *process camera* which can handle originals of virtually any size—even a small one could manage artwork a metre square, and film of more than A4 size. Larger units are horizontal, with the original arranged vertically in one room, the film section in another, and the lens section between the two.

Focusing is by a system of gears and pulleys on a ground glass screen which hinges out of the way to be replaced by a *vacuum easel*. This holds the dot screen

Making your own screen

Although it is much simpler and cheaper to make a screen than to make your own negative, it is possible to create a wide range of effects.

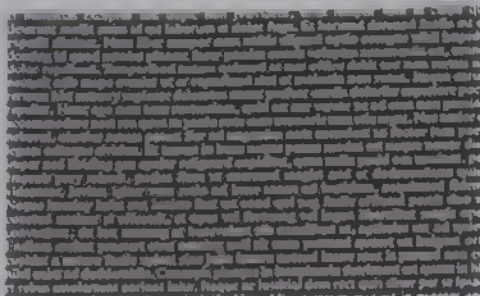
To make your own screen, choose some suitable material to print the pattern. For a conventional screen, the material could be the non-vignetted part of a contact print. For a more unusual effect, you could use net curtains or even a piece of fabric.

The pattern is copied on to a contact print. To produce the vignetted effect, you should defocus the pattern by separating the pattern from the copy film with a clean sheet of glass. By varying the distance or diameter of the light you can control the amount of vignetting. For coarse originals, such as net curtains, you may need to rotate the print in a spiral pattern to vignette.

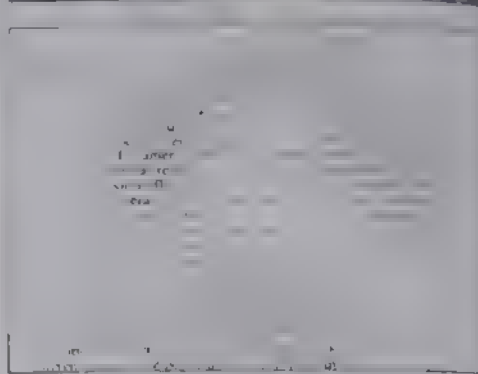
If the density range is correct, the gaps on the vignetted screen should be virtually clear and the dense parts of the pattern moderately dense. If the dense parts are too pale, you will find that the pattern has little effect on the image. Aim to make them slightly denser than the densest parts of the negative.



Your original may be taken from dry transfer texture screens, or anything that gives an even, regular pattern



The contact screen is made by copying on to tone film, defocusing the image slightly to produce the vignetting



Print through the contact screen on to lith film to convert the original into letter thicknesses for this effect

perfectly flat against the sheet of paper, and it covers

An amateur does not of course have these facilities on quite such a grand scale—but can use an enlarger in one of two ways. As a process camera, the enlarger can be used to copy an original on the baseboard using standard copying techniques (see pages 944 to 947 and 1121 to 1123). The film is placed behind—on top—of the screen during copying. Although the directness of this method is appealing, you are restricted to a negative size dictated by the negative carrier and enlarger lens.

One way round the problem is to make use of a finer screen and then subsequently enlarge the screened negative to make a positive suitable for dot-for-dot reproduction.

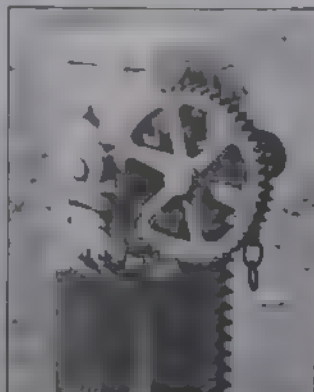
The second method is to project the original on to a screen-film sandwich. Again, the screen should be nearest the lens and have its emulsion side in contact

with the film emulsion. To ensure good contact—vital for good dot quality—use a sponge mat and black paper backing weighed down by a sheet of clean glass placed on top of the screen.

For black and white originals, ordinary orthochromatic lith material is used for the negative. If the original is in colour, you should use panchromatic film or produce an intermediate 'one-colour' black and white positive unless some tone distortion is permissible.

It is important to use fresh lith developer when processing negatives otherwise dot quality suffers. The lith film is developed normally, usually to a set time somewhere between two and three minutes, depending on the maker's recommendations. Stick to one time, say

Correct flash exposure is essential for good contrast (centre)—too much exposure gives a washed out image (right); too little gives excessive contrast (left)



Contrast control

[illegible]

Process camera This shows a professional set-up where the operator is 'sizing up', in the film room, the image of the original artwork projected by the process camera from the adjacent room





En route

Every time you drive along a country road you pass potential photographic subjects. Colin Molyneux shows that often if you concentrate on a limited area you can make something out of even the most unlikely stretch of road

Often one of the main problems for a photographer is that you are faced with a wide-ranging subject to shoot a few photographs. However, the discipline of deliberately opting for a limited subject can be a very stimulating exercise. It teaches you to look harder for pictures, often creating attractive images in places where you would normally not bother.

To illustrate what can be done in an exercise of this sort, we asked professional photographer Colin Molyneux to shoot a set of pictures taken along a stretch of ordinary road.

Roadside house For this shot, Colin used a 24 mm lens to emphasize the sweep of the bend and include more of the setting

Winding road A 300 mm lens provided the strong composition, but Colin had to wait an hour for the right light

Kerbside beauty A 55 mm Micro Nikkor allowed Colin to isolate small details like these roadside wild flowers

Road markings The compression of a 500 mm lens created this shot, the kind of subject few would notice





... of countryside and nothing catches your attention. But once in a while you find the same place when the weather changes everything looks like it

... only a few kilometres long, but I found several places to use his 300 mm or 400 mm telephotos, exploiting their

Assignment

Passing car

The tractor

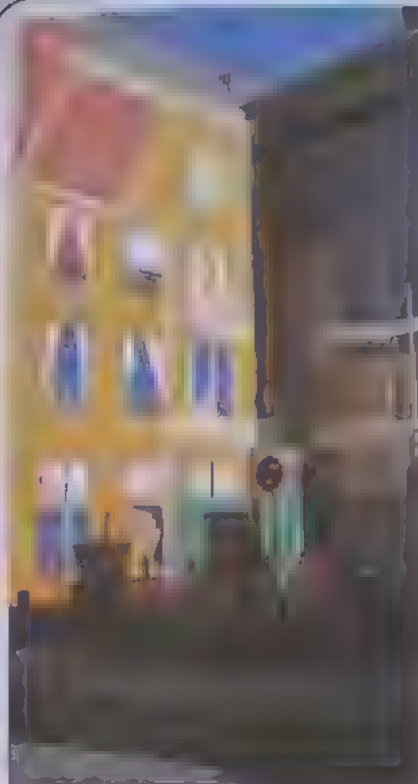
Town street



What went wrong?

Corners

Corners of rooms or buildings appear quite often in photographs—they have an atmospheric feel. John Sims analyzes the composition of four corner shots.



This photograph, from the corner of a street, is an attempt to use shadows to good effect by creating an interesting, semi-abstract pattern. On the evidence it is difficult to judge whether a stronger and more emphatic use of the calendar could have been achieved by moving in much closer and by using a wider lens.



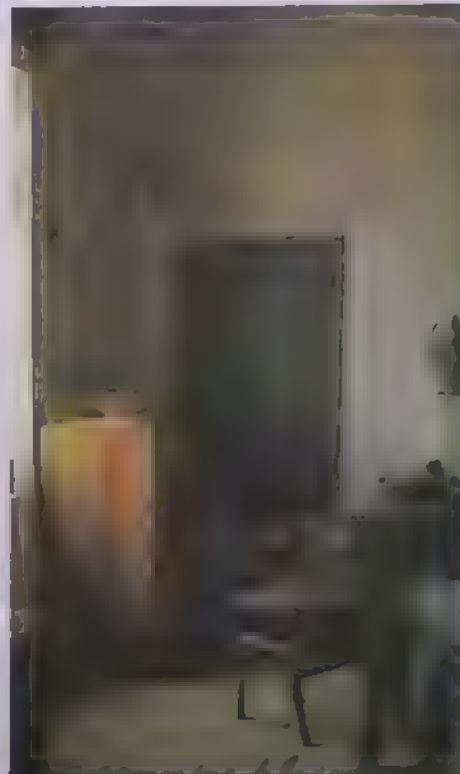
Even had this little distraction or attraction been included in the picture the photograph would not have worked because two of the visible faces are substantially in shadow. Indeed, they have their backs to the low angled, contrasty light. Of the four people in the picture only one, the woman is clearly recognizable.



This photograph provides a good example of an attempt to use shadows to good effect by creating an interesting, semi-abstract pattern. On the evidence it is difficult to judge whether a stronger and more emphatic use of the calendar could have been achieved by moving in much closer and by using a wider lens.

The green cast, caused by reflected light from a lawn or similar expanse of green vegetation outside the window, is to my mind distracting. It could be removed partially with an 81A filter or completely with a magenta fluorescent-to-daylight type correction filter.

The impact of such a picture depends very much on your own personal taste in photography.



Here is a photograph of the interior of a small room, probably a kitchen in a Greek holiday villa. Perhaps it is the villa in the example above. Since, to my mind, there is not one feature in itself of great visual interest, I would have introduced a person into the picture. This person can then be used to create a link with the room either in a complementary way say by using the Greek owner of the villa, or one of the Western, bikini-clad holiday-makers as a contrast. This device would also impart a time element into the photograph—traditional and static versus modern and temporary.



Henri Cartier-Bresson



With a supreme talent for combining art and information in one telling shot, Cartier-Bresson is recognized by photographers and the public alike as the most influential master of photography in the twentieth century

Few photographers manage to achieve fame in their own lifetime, especially outside the small world of photography. But one man, Henri Cartier-Bresson, has done more than that. Both he and his pictures have achieved an almost legendary status. And his approach to photography, that of the discreet career capturing 'the decisive moment', has been taken up by countless photographers, amateur and professional.

To most people Cartier-Bresson is his pictures. Since the 1930s, when he first took photography up seriously, he has carefully maintained a personal anonymity. While his pictures became well-known and instantly recognizable, he hid behind his Leica. And even when his photos were being exhibited and published in books and magazines all over the world he refused to be photographed himself so that he could continue to photograph unnoticed.

Nowadays, Cartier-Bresson is widely regarded as one of the world's greatest photographers but his painting and drawing is still more important than his

Alicante, Spain, 1932

photography. To him, photography is a special way of seeing the world, which is not very different from the way he was trained to see it. For two years, from 1927 to 1929, he worked in the studio of the French Cubist painter Andre Lhote.

Cartier-Bresson has always retained his interest in drawing and, in recent years he has returned to drawing and painting, only taking photographs for his own pleasure. Nevertheless, he still regards photography as the best way of simply recording a scene. 'In my opinion, there is a common point of departure for both drawing and photography: the act of looking. But from then on they diverge: drawing is an elaboration on reality, whereas photography, for me, is an intuition, a supreme moment captured with a single shot.'

Cartier-Bresson's interest in photography started in his childhood when he was given an early Box Brownie. Then, influenced by Atget's pictures, he

started using a large format camera, which had a lens cap for a shutter. He did not use one of the revolutionary new miniature cameras (see page 2324) until 1931 when, at the age of 22, he took a small camera made by the French firm Krauss on a trip to Africa.

It was in 1932, while convalescing in Marseilles from the blackwater fever he had contracted in Africa, that Cartier-Bresson discovered the camera which was virtually to become his trademark. 'I had just discovered the Leica. It became the extension of my eye, and I have never been separated from it since I found it. I prowled the streets all day, feeling very strung up and ready to pounce, determined to "trap" life—to preserve life in the act of living.'

Cartier-Bresson immediately became a prolific photographer, and had his first major exhibition in the same year. He also started to travel again and in 1935 went to the USA. While he was there he met the photographer Paul Strand who taught him the basics of film making. Movies had been a childhood passion.



and Cartier-Bresson's first book, *War and Peace*, was published in 1938. It was a landmark work, the first of a series of books that would establish his reputation as a photographer and a writer. The book was a collection of photographs and text, a testament to his unique vision and his ability to capture the essence of a moment.

The experience was to prove useful later when he made his own documentary films—on hospitals in the Spanish Civil War, homecoming French POWs (*Le Retour*, 1944) and for CBS in California (1970) and Mississippi (1971).

The fact that he chose to make documentary rather than narrative films is significant. His whole approach to photography is that of the observer. He has travelled all over the world, most notably in Asia and North America to document other peoples and cultures,

and he has always been a keen observer of the world around him. He has captured those decisive moments that are the essence of a scene, the moments that are the essence of a scene. He has captured those moments that are the essence of a scene, the moments that are the essence of a scene. He has captured those moments that are the essence of a scene, the moments that are the essence of a scene.

The concept of capturing the essence of a scene in one picture is a concept which has become irrevocably linked with Cartier-Bresson—that of the 'decisive moment'. This comes from a passage in the memoirs of Cardinal de Retz—"There is nothing in this world



Seville, Spain, 1933

Colette and her companion, 1946

which hasn't a decisive moment." Cartier-Bresson has captured the essence of a scene in one picture. He has captured those moments that are the essence of a scene, the moments that are the essence of a scene. He has captured those moments that are the essence of a scene, the moments that are the essence of a scene.

The phrase 'decisive moment' is a concept which has become irrevocably linked with Cartier-Bresson—that of the 'decisive moment'. This comes from a passage in the memoirs of Cardinal de Retz—"There is nothing in this world which hasn't a decisive moment." Cartier-Bresson has captured the essence of a scene in one picture. He has captured those moments that are the essence of a scene, the moments that are the essence of a scene. He has captured those moments that are the essence of a scene, the moments that are the essence of a scene.

There are many ways of looking at the world. Cartier-Bresson's way is a way of looking at the world that is unique. He has captured those moments that are the essence of a scene, the moments that are the essence of a scene. He has captured those moments that are the essence of a scene, the moments that are the essence of a scene. He has captured those moments that are the essence of a scene, the moments that are the essence of a scene.

Instead, the pictures should be seen as



During his career, Hyeres has photographed many important events. Some of his most famous photoessays include pictures taken during the last days of the Vietnam War, the Prague Spring, and the fall of the Berlin Wall. He has also photographed the Olympic Games, the World Cup, and the Euro Cup.

During his career, Hyeres has photographed many important events. Some of his most famous photoessays include pictures taken during the last days of the Vietnam War, the Prague Spring, and the fall of the Berlin Wall. He has also photographed the Olympic Games, the World Cup, and the Euro Cup.

During his career, Hyeres has photographed many important events. Some of his most famous photoessays include pictures taken during the last days of the Vietnam War, the Prague Spring, and the fall of the Berlin Wall. He has also photographed the Olympic Games, the World Cup, and the Euro Cup.

Hieres, France, 1938

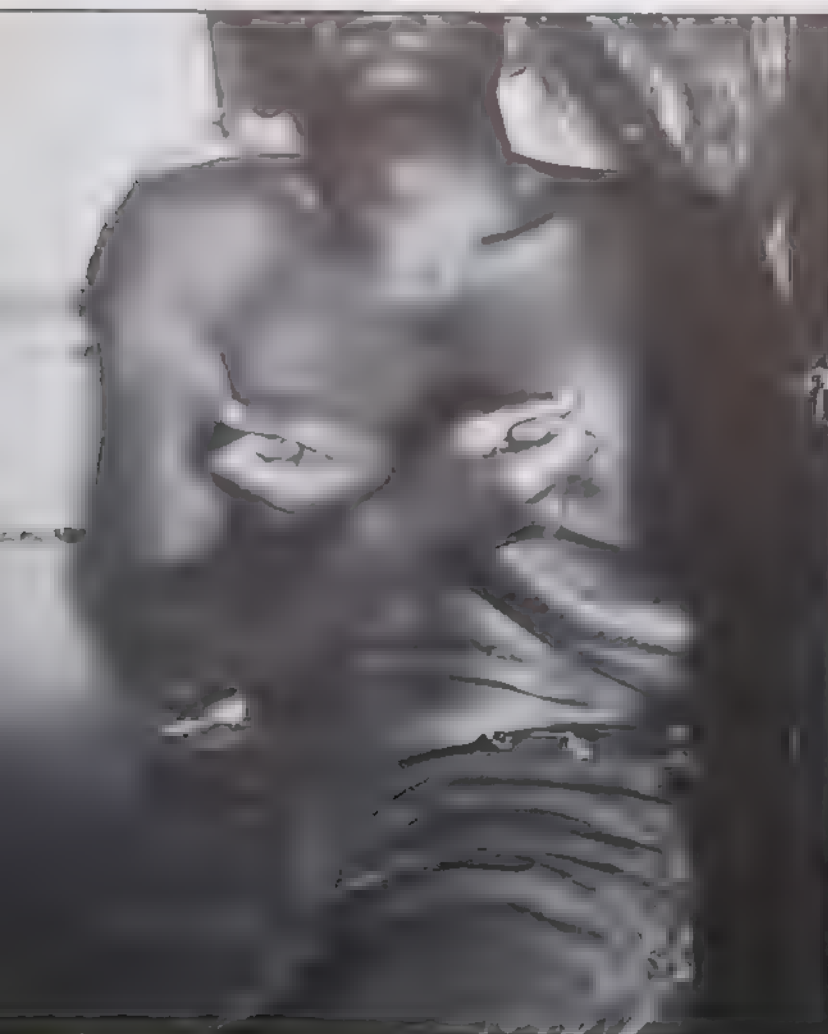




Trafalgar Square, London, on George VI's coronation day, 1937



On the banks of the Marne, France, 1938





Italy, 1965 (right)

[illegible]

Gestapo informer recognized by a woman she had denounced, deportation camp, Dessau, Germany, 1945



Mexico, 1934 (left)



parts of his cameras and lenses to make them less obtrusive

He now photographs exclusively in black and white. In recent years he has used Tri-X which he bulk loads himself into Leica cassettes. This is developed in Microdol and printed, on Ilford paper by Pierre Gassman laboratories in Paris.

[illegible]

Nevertheless, to Cartier-Bresson, technique and equipment are simply a means to an end. The photographer's instincts and vision—the ability to



Funeral of a Kabuki actor, Japan, 1965





Bank officer and secretary, New York, 1960



Cell of a model prison, United States, 1975

quickly composed and ready to go. The instruction is to go into the darkroom to develop the film and vision should be there. If it is not, pressing the shutter will be the end of the shot was not right. Corlier Bresson tries to correct it with the next one.

Corlier Bresson's approach is not realism. He nearly always shoots from the eye level, as this is the way we see the world. For the same reason, most of the pictures are taken with what is called

not creating but capturing the moment. It is being there for the moment.

We print in perfect black and white, supporting the original. We work in terms of the original and must therefore be able to adapt it.

At the end of the film, the man is looking at the camera. He is looking at the camera.

Optical calculations-2

Depth of field calculations can reveal some surprising aspects of photography—and they are easy to carry out, particularly if you have a pocket calculator or even a microcomputer to help you

Which lens?



Standard lens It is a common myth that different lenses have different depths of field. This shot was taken using a standard lens with extension tube, at an aperture of $f/16$, the smallest possible, yet the butterfly is not sharp from wingtip to wingtip. Will a different focal length help to improve depth of field?



Telephoto lens A 135 mm lens, at the same aperture and scale, gives identical depth of field—and a wide angle would do the same. But a telephoto may stop down to $f/22$, giving better depth of field, and also allows you to photograph from a greater distance, avoiding scaring the butterfly away

It is very useful to know the depth of field which your lens is giving you in any particular situation. But depth of field scales marked on lenses give only very approximate values, often omitting many of the apertures altogether. Many zoom lenses have no scales at all and judging sharpness on a ground glass screen is far from easy when the lens is stopped down because of the darkness of the image. Fortunately, it is possible to work out depth of field yourself on a pocket calculator.

The most useful type of calculator is a programmable one, as some of the values in the equations are fixed. The factors involved, which are chosen by the photographer, are the focal length of the lens (f), the effective aperture (N) and the focused distance (u). The fourth factor, the circle of confusion (C), remains fixed for a given format (see page 963). Its value is usually taken as 0.033 mm for the 35 mm and

0.05 mm for 6 x 6 cm format. Formerly, a variable value of C was used—normally 1 divided by 1000—so that C varied with focal length. This, plus the fact that a fixed value of C is used now, means that there are serious discrepancies between the various depth of field tables available for particular focal lengths. The advantage of working out your own tables is that you can choose your own value for C .

Once you have decided on a value for C you can use it to find values for the nearest point in focus, D_n , and the furthest point in focus, D_f , using these equations:

$$1) D_n = \frac{uf^2}{f^2 + uCN}$$

$$2) D_f = \frac{uf^2}{f^2 - uCN}$$

The depth of field, D , is given by $D = D_f - D_n$.

Some experimentation may be needed to find a

suitable keying-in sequence for these equations. A calculator with three or four memories is an advantage as the various parts of the equations can be worked out separately, stored and then brought back when needed. If you do not want to know the actual values for the nearest and furthest point in focus, but simply want to know how much depth of field there is, you can use this formula:

$$D = \frac{2CNu^2}{f^2}$$

This is an equation derived from the two main ones above. It is slightly less accurate, but is useful when full calculations are unnecessary. In all these equations the units used should be consistent throughout. It is probably easiest to work in millimetres. This gives answers for D_f , D_n and D also in millimetres. In some situations this may be acceptable—for

example, when using telephoto lenses with wide apertures at close distances. But in most cases it is best to convert the final results into metres (by dividing by 1000).

Example results

Calculating a few figures for your main lenses gives you a better practical idea of depth of field. For example, a 28-85 mm zoom lens, focused at 1 m and set at $f/4$, gives a depth of field of 37 mm, 106 mm and 347 mm at focal length settings of 85 mm, 50 mm and 28 mm respectively. This means that the depth of field at the widest setting is nearly ten times that at 85 mm.

At the 28 mm setting and 1 m focus, altering the aperture from $f/2.8$ to $f/16$ changes the depth of field from 239 mm to 2470 mm, a ratio of 10.4 to 1. At 85 mm the range is from 26 to 147 mm, a ratio of 5.7 to 1. So it can be seen that stopping down increases depth of field more dramatically with a wide angle lens than with a

Where is infinity?

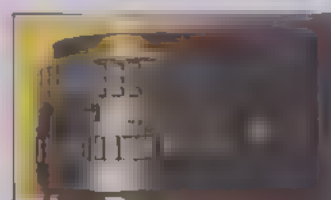


Infinite tree Calculations show that an object at 38 m—here the nearby tree in line with the steeple—should appear sharp through this 50 mm lens working at $f/2$

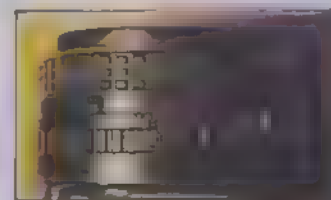


Nearer tree Moving just 3 m closer to the tree it appears more blurred, though enlargement. But on a smaller print, such results might be perfectly acceptable

Changing the value of 'C'



Blurred hat The lens was focused so that the hat, 5 m away, would just be in focus according to the depth of field scale on the lens, using an aperture of $f/16$. A 20× enlargement shows that the image of the hat is not critically sharp, especially when inside the true focus



Sharp hat At the same aperture of $f/16$, the lens was refocused using the $f/8$ mark on the depth of field scale thus using a more critical value of 'C'. The results are as sharp as if the lens was focusing at the correct distance, when using Ektachrome 64

From near to infinity

As the distance of an object increases, the image formed by a lens moves closer to the focal point. In order to get depth of field from half that distance to infinity—this being the greatest depth of field possible with that lens at that aperture. The equation is

$$h = \frac{f^2}{NC}$$

where h is the hyperfocal distance, f is the focal length, N is the aperture, and C is the circle of confusion. The amount are simply 'infinity'. However, an object is actually at infinity—it is simply a term used for distances which are so great that rays of light from objects at those distances are so close together that any divergence

can be ignored. But the nearest distance that can be taken to be at infinity varies with focal length, circle of confusion and aperture

For example, infinity for a 50 mm lens set at $f/2$ is at approximately 38 m, while for

a 100 mm lens at the same aperture it is around 150 m. The distance for infinity increases to around 300 m for a 200 mm lens at $f/4$. For a 500 mm at $f/5.6$ it is slightly over 1.3 kilometres! Stopping down brings 'infinity' closer

These are theoretical limits, and manufacturers who publish depth of field tables often take infinity as being much closer. But when you are calculating depth of field tables it is worth bearing this aspect in mind

Oktoberfest

Fast work and basic equipment are the main requirements for success at a fast-moving event, as David Hoffman discovered when he visited the Munich Beer Festival



Each year, over the last two weeks of September and the first two weeks of October, Munich is the busiest drinking scene in the world. For me, the photographic and cinematic world opened the door to explore the photographic possibilities presented by the spectacle of thousands of people celebrating in mass pursuit of pleasure.

Photography is a matter of the public. David moved with the vast crowds, a head in the crowd and moving on. He found that where other people were not as prepared, more interested in their own interests which gave him a considerable degree of freedom.

He took along two Nikon F2 bodies and an FE along with a range of lenses from 24 mm to 200 mm. However, the need for fast action and consequent simplicity meant that almost all the shots were taken on the F2 bodies, one mounted with a 35 mm f/2 and one with a 105 mm f/2.8.

The 105 mm was particularly useful for grabbing quick candid photos while in the interior shots its wide aperture allowed for quick and accurate focusing.

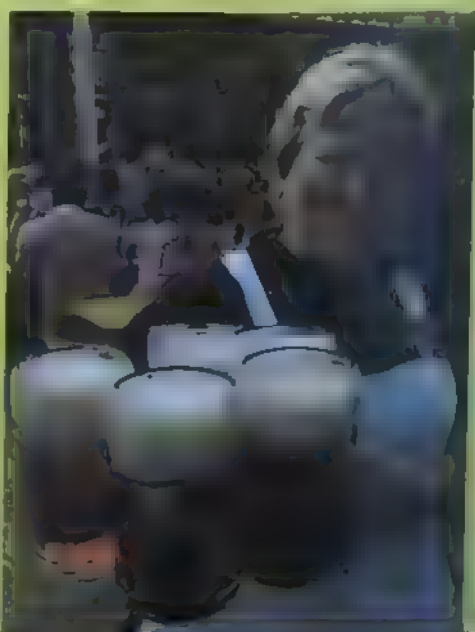
David had chosen 200 ASA Ektachrome EPD as its relatively fast speed was adequate for shooting in the low light of the main beer hall where outside it allowed for the use of wide apertures giving different effects on unframed portraits. Occasionally David used a Metz 45 C.F. flash but he preferred to shoot by available light, waiting in dark corners and trying to stay invisible.

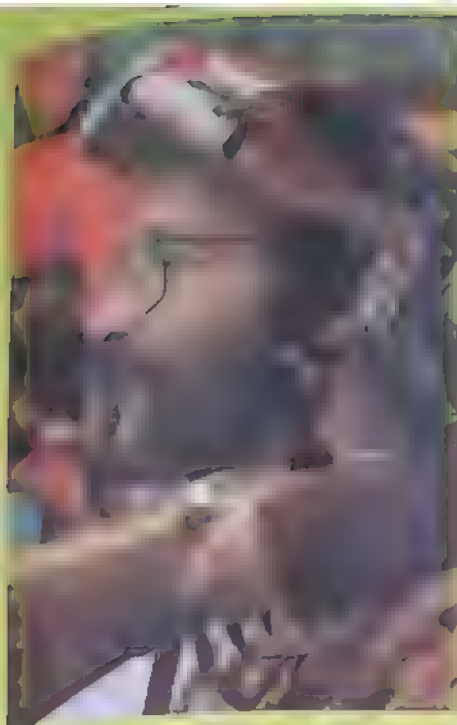
Occasionally David's presence aroused a certain amount of animosity. One man approached me rather unsteadily waving a large knife vaguely in my direction, but I pushed him to one side and he disappeared into the crowds. Generally speaking a few conciliatory gestures and some carefully rehearsed words of German were enough to defuse tense situations.

David was at the festival during the first weekend. 'The Saturday', he says 'was a real let down—not much going on and a mizzling rain making photography difficult. On the Sunday the event sprang to life with whole villages and factories arriving, getting tipsy and having a good time'.

Dancers For moving subjects in low light levels a fast film is essential—here 200 ASA.

Barmaid Rather than posing his subject, David lay in wait with a pre-focused camera and took the shot as the barmaid came into view.



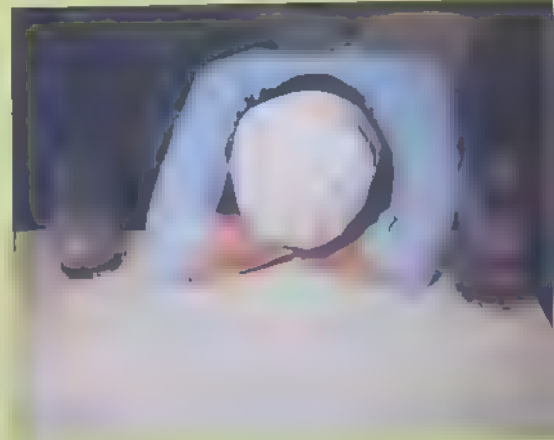


Profile A medium telephoto allows tight framing and differential focusing to blur a distracting background
Float Carnival processions offer many colourful and willing subjects.
Main hall David used a wide angle lens to achieve an overall view of the scene

aspects of the

the beer hall,
 in national
 however, requir
 approach

Any events
 be covered com
 the most basic equipment The prof
 sional enjoys no special advantage
 In fact the large selection of equipment
 which often gives the professional an
 advantage over the amateur is a positive
 disadvantage in a busy, milling crowd
 "The main requirements," says David
 'are a fast eye and, on occasion, a fast
 tongue"



Resting To show all aspects of the
 festival David took this picture of one
 of its victims, contrasting with the
 happier shots.

Lovers When spotted while taking candid
 David smiled to show good intent and this
 was enough to prevent friction

PHOTO ESSAYS

One of the most effective ways of giving a complete and rounded impression of people, places or events is to make a 'photo essay' on the subject. But to work well, the images must be carefully planned and selected



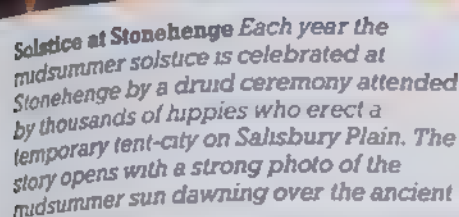
Most people take photographs to tell a story or to record a moment. But a photo essay is a more complex and deliberate form of visual communication. It is a series of photographs that are carefully selected and arranged to tell a story or to explore a theme. The purpose of a photo essay is to provide a more complete and rounded impression of a subject than a single photograph could. To work well, the images must be carefully planned and selected.

The photo essay is the result of a deliberate choice of purpose. It is a series of photographs that are carefully selected and arranged to tell a story or to explore a theme. The purpose of a photo essay is to provide a more complete and rounded impression of a subject than a single photograph could. To work well, the images must be carefully planned and selected. The approach gives the photographer the chance to explore ideas about a subject and show different aspects of it making it possible to do justice to those subjects that are too involved or diverse to be summarized neatly. Although the craft of the photo essay has been

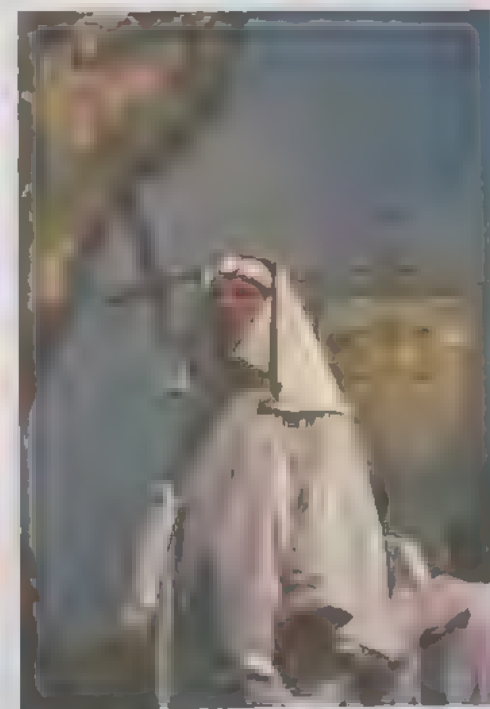
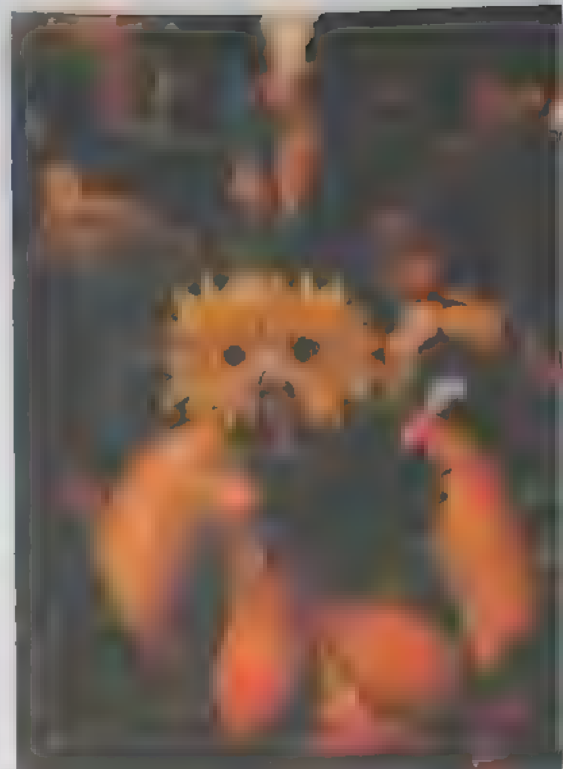
developed into a form of visual communication, it is still a relatively new and experimental form. It is a series of photographs that are carefully selected and arranged to tell a story or to explore a theme. The purpose of a photo essay is to provide a more complete and rounded impression of a subject than a single photograph could. To work well, the images must be carefully planned and selected. The approach gives the photographer the chance to explore ideas about a subject and show different aspects of it making it possible to do justice to those subjects that are too involved or diverse to be summarized neatly. Although the craft of the photo essay has been developed into a form of visual communication, it is still a relatively new and experimental form. It is a series of photographs that are carefully selected and arranged to tell a story or to explore a theme. The purpose of a photo essay is to provide a more complete and rounded impression of a subject than a single photograph could. To work well, the images must be carefully planned and selected. The approach gives the photographer the chance to explore ideas about a subject and show different aspects of it making it possible to do justice to those subjects that are too involved or diverse to be summarized neatly. Although the craft of the photo essay has been

In the narrative style of photo essay the pictures are shot as a sequence and used to show an event happening over a period of time. This could be something as straightforward as the way in which something is made, or it could involve





circle and then explores various aspects of the event. Druids and nipples are photographed in full regalia and a distant shot of the teepee commune adds variety and shows the size of the gathering. The druid ceremony which provides the focus for the event makes a strong closing shot.



Probably one of the easiest types of narrative to say to use as a starting point is a crafts sequence. Choose something in which you have reasonably easy access and that can be completed in a fairly short span of time. The making of a ceramic pot could, for example, make a very satisfactory sequence. Before you begin, find out exactly what will happen and in how many stages. Then work out roughly how many steps you will need to photograph to make sense of the operation. This, after all, is the purpose of a narrative photo essay—to dissect the processes as clearly as possible.

When a writer is faced with a large number of items, it can be tempting to list them all in a single paragraph. However, this can make the text difficult to read. Instead, it is often better to group the items into smaller sections, each with its own heading. This makes the text more organized and easier to navigate. For example, if you are writing about a company's products, you might have sections for each product line, with sub-sections for individual products. This helps the reader find the information they need more quickly and makes the text more professional.

[illegible]



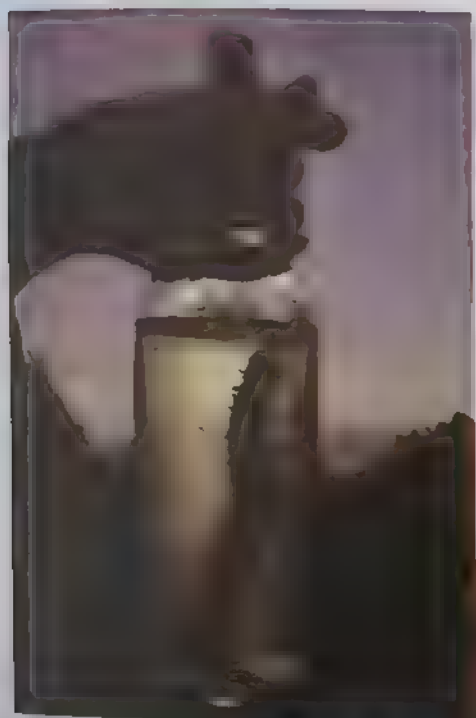
THE PHOTO ESSAY IS A FORM OF NARRATIVE. IT IS A WAY OF TELLING A STORY THROUGH A SERIES OF IMAGES. IT IS A WAY OF LOOKING AT THE WORLD AND SHARING YOUR VIEW WITH OTHERS. IT IS A WAY OF EXPLORING A SUBJECT AND DISCOVERING NEW WAYS OF LOOKING AT IT. IT IS A WAY OF CREATING A NEW NARRATIVE AND SHARING IT WITH OTHERS. IT IS A WAY OF EXPLORING A SUBJECT AND DISCOVERING NEW WAYS OF LOOKING AT IT. IT IS A WAY OF CREATING A NEW NARRATIVE AND SHARING IT WITH OTHERS.

THE PHOTO ESSAY IS A FORM OF NARRATIVE. IT IS A WAY OF TELLING A STORY THROUGH A SERIES OF IMAGES. IT IS A WAY OF LOOKING AT THE WORLD AND SHARING YOUR VIEW WITH OTHERS. IT IS A WAY OF EXPLORING A SUBJECT AND DISCOVERING NEW WAYS OF LOOKING AT IT. IT IS A WAY OF CREATING A NEW NARRATIVE AND SHARING IT WITH OTHERS. IT IS A WAY OF EXPLORING A SUBJECT AND DISCOVERING NEW WAYS OF LOOKING AT IT. IT IS A WAY OF CREATING A NEW NARRATIVE AND SHARING IT WITH OTHERS.

THE PHOTO ESSAY IS A FORM OF NARRATIVE. IT IS A WAY OF TELLING A STORY THROUGH A SERIES OF IMAGES. IT IS A WAY OF LOOKING AT THE WORLD AND SHARING YOUR VIEW WITH OTHERS. IT IS A WAY OF EXPLORING A SUBJECT AND DISCOVERING NEW WAYS OF LOOKING AT IT. IT IS A WAY OF CREATING A NEW NARRATIVE AND SHARING IT WITH OTHERS. IT IS A WAY OF EXPLORING A SUBJECT AND DISCOVERING NEW WAYS OF LOOKING AT IT. IT IS A WAY OF CREATING A NEW NARRATIVE AND SHARING IT WITH OTHERS.

THE PHOTO ESSAY IS A FORM OF NARRATIVE. IT IS A WAY OF TELLING A STORY THROUGH A SERIES OF IMAGES. IT IS A WAY OF LOOKING AT THE WORLD AND SHARING YOUR VIEW WITH OTHERS. IT IS A WAY OF EXPLORING A SUBJECT AND DISCOVERING NEW WAYS OF LOOKING AT IT. IT IS A WAY OF CREATING A NEW NARRATIVE AND SHARING IT WITH OTHERS. IT IS A WAY OF EXPLORING A SUBJECT AND DISCOVERING NEW WAYS OF LOOKING AT IT. IT IS A WAY OF CREATING A NEW NARRATIVE AND SHARING IT WITH OTHERS.





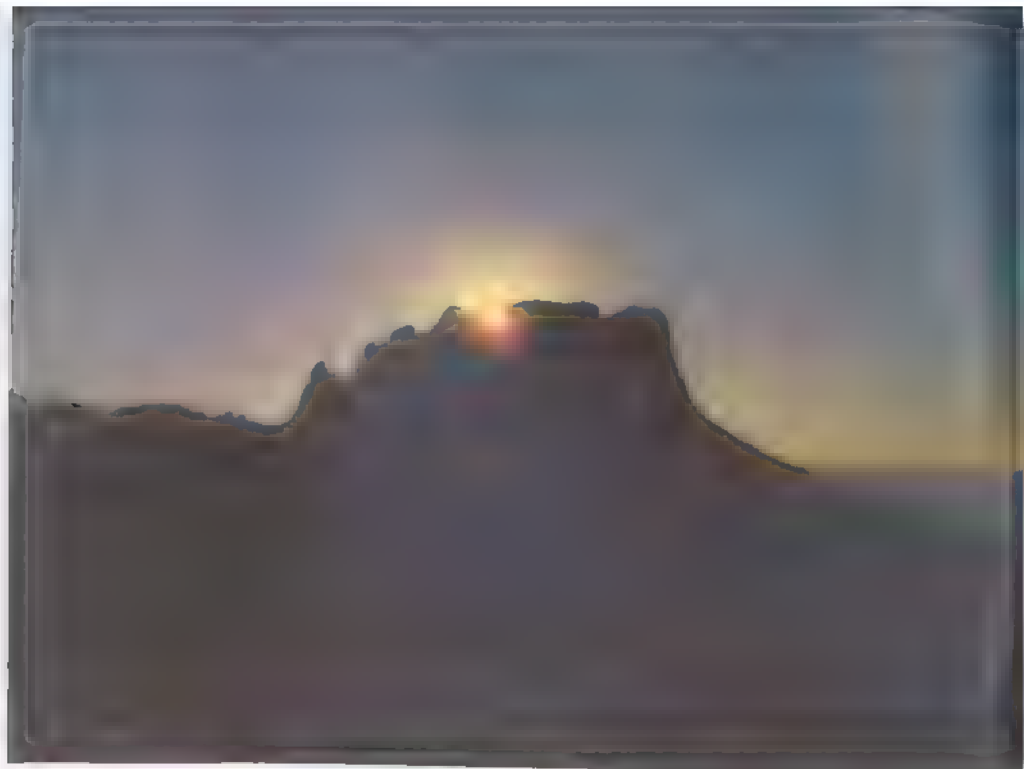
life. When taken in this way, they are concentrated on a single subject and they are not at all in a hurry. Now the photographer is able to be a star when it comes to the camera. To make sure that the camera is not too far away, he has to be very close. This is sometimes known as a point of view, and it is usually an important part of photo essays—they need a few unusual pictures among the really strong images that photographers spend most

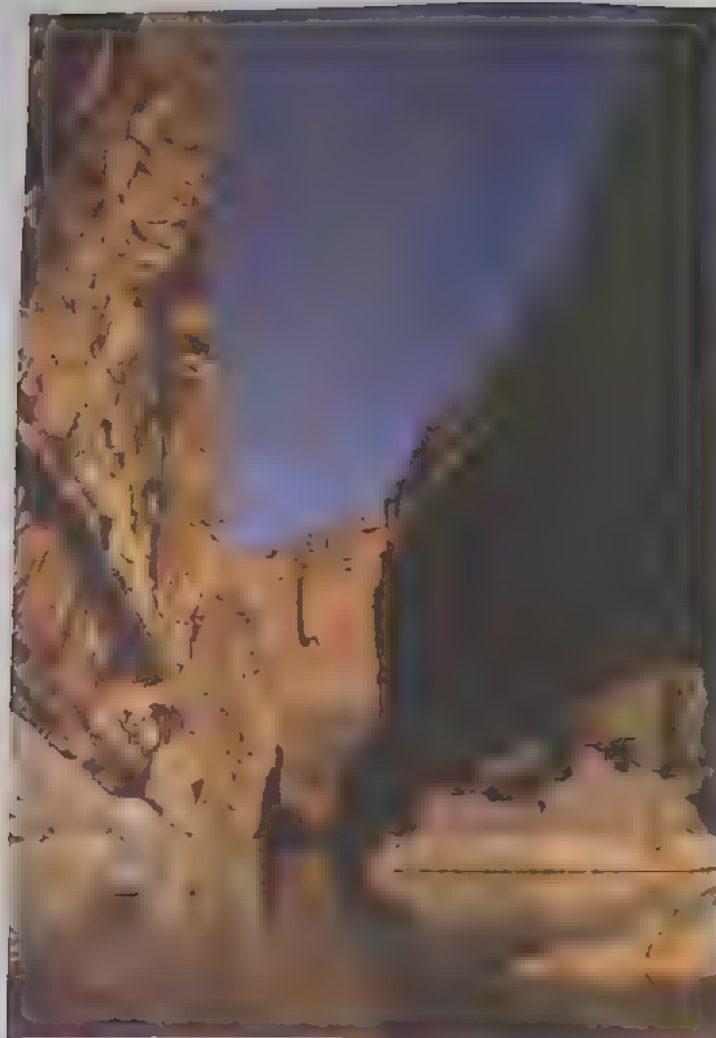
of their time taking. The photographer is not a star when it comes to the camera. To make sure that the camera is not too far away, he has to be very close. This is sometimes known as a point of view, and it is usually an important part of photo essays—they need a few unusual pictures among the really strong images that photographers spend most of their time taking.

The photographer is not a star when it comes to the camera. To make sure that the camera is not too far away, he has to be very close. This is sometimes known as a point of view, and it is usually an important part of photo essays—they need a few unusual pictures among the really strong images that photographers spend most of their time taking.



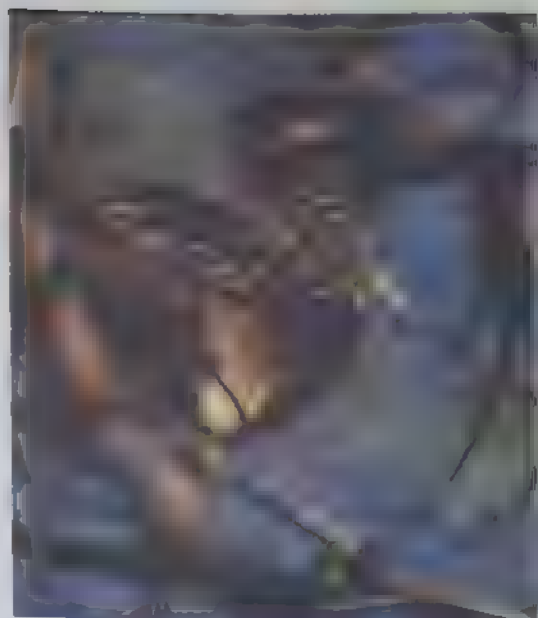
Thailand In this photo essay, the photographer has combined shots of the location with pictures of everyday life to give a clear impression of this village in Thailand. Record shots of roof-building and cooking are balanced with images of strong visual impact such as the silhouettes of women carrying reed bundles and the atmospheric photo of a misty dawn over the village. The portrait of the pipe smoker, so proud of her fine jewellery, reminds us that this series is basically about people. The shots of the leech, reputed to have magic properties, and of the funeral procession, show how different their life is from our own very effectively





Big Bend This sequence from Big Bend National Park, Texas, shows how a variety of approaches can help give a complete picture. The vast grandeur of the scenery is set against details of the landscape

In the opening shot of the essay sunrise over the Casa Grande, detail is sacrificed for the power of a strong image. Individual features show the park on another scale; from the point of view of its inhabitants. The roadrunner bearing a courtship offering and the Western Coachwhip snake show how this inhospitable landscape is in fact teeming with life. Compare the yellow longspur columbine, a straightforward record shot, with the red cactus flowers, photographed among their surroundings



of door knockers all printed up together. Another way of combining several photographs is in a time sequence to form a mini essay within the overall structure. At a sports event for instance a motor drive sequence of some small, limited action could be presented in a strip instead of editing.



How cameras are made

Camera manufacturing techniques are as varied as the cameras themselves, from old fashioned, hand-crafted bellows cameras to mass-produced snapshot cameras—is either method superior?



Nippon Kogaku K.K./Nikon (UK) Ltd

The design of camera components and materials are often subject to change. In the manufacturing process, each component must be made to the required specification and, if necessary, during manufacture, a component may be redesigned so it is simpler and less expensive to make. At all stages, there is a continuous feedback between design and production.

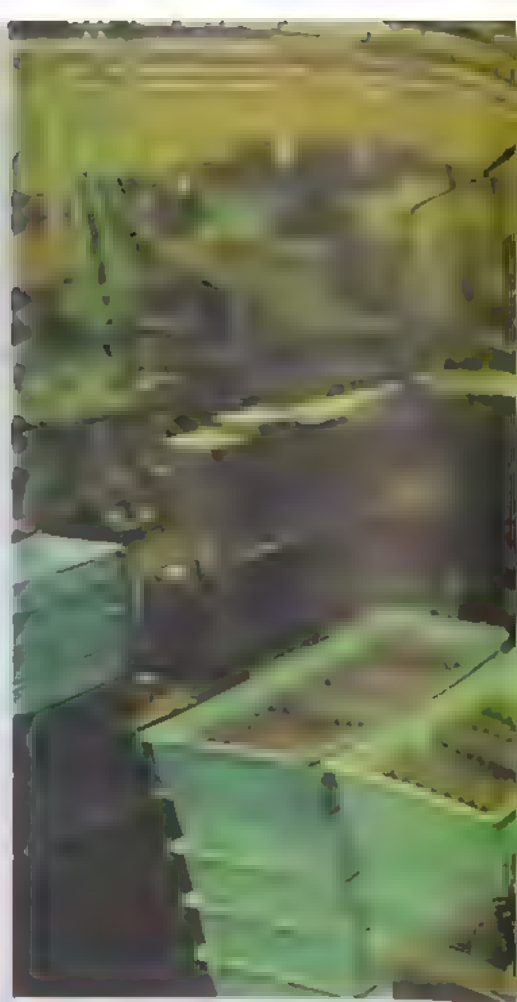
There might also be a need for production engineering, which is the business of adapting production machinery to the job in hand. In the toolroom, or the amateur workshop,

it is the engineer's job to make the tools and equipment needed for the work. This is a highly skilled job, and the engineer must be able to make the tools and equipment to the required specification.

It is the engineer's job to make the tools and equipment needed for the work. This is a highly skilled job, and the engineer must be able to make the tools and equipment to the required specification. One example of a camera component is the camera shutter—either the traditional leaf type, or the blade shutter of the copal square type. Usually the sub-

system is made by the manufacturer, but the engineer may be able to make a replacement shutter for a camera.

The camera is a complex machine, and the engineer must be able to make the tools and equipment needed for the work. This is a highly skilled job, and the engineer must be able to make the tools and equipment to the required specification. One example of a camera component is the camera shutter—either the traditional leaf type, or the blade shutter of the copal square type. Usually the sub-





Production techniques vary greatly, but few cameras are constructed totally manually. In fact, most manufacturers combine automation (for certain components and subsystems) with manual assembly by highly skilled workers. The manufacture of die-cast bodies, even to the drilling of holes and tapping of screw threads, is commonly automated (above). The assembly of subsystems, such as the shutter (left) and top plate (above), on to the body is also done on a production line basis

and, for example, is often done by die-casting and metal pressing. Next come the mechanical parts. In ascending order of cost they are drilling, turning, milling and grinding. Plastic is suitable for only certain types of applications. Where plastic is suitable, die-cast alloy and pressed or stamped metal are the next resort. For a camera chassis, die-casting is the only manufacturing process for light, strong, intricate shapes. Even if production is

small, the cost of the tooling is high. The cost of the material is also high. The cost of the labour is high. The cost of the overheads is high. The cost of the profit is high. The cost of the camera is high.

For a camera, the cost of the material is high. The cost of the labour is high. The cost of the overheads is high. The cost of the profit is high. The cost of the camera is high.

For a camera, the cost of the material is high. The cost of the labour is high. The cost of the overheads is high. The cost of the profit is high. The cost of the camera is high.

Canon/Kodak

sometimes a manufacturer will use a completely specialized machine. The cheapest and simplest is a lathe. Drilling machines and turret lathes are the next step. They are used for the most intricate automatic turning and broaching machines. If the same investment can be considered.

To justify the expense of these machines, the throughput needs to be considerable. So some manufacturers avoid automation, particularly if the work can be done adequately by skilled

subcontractors. Furthermore the manufacturer might have to make do with existing components that are not ideal—it was the restriction of speed and close-focusing ability that led to which prompted Hasselblad to design and build the 2000FC, with a complete shutter.

Still, with bought-in components a specialized manufacturer may be able to offer his speciality at a remarkably low cost. A compur shutter may seem expensive, but it would probably cost three times as much if development and specialist machinery costs had not been recouped over such a long period of time and so many million units.

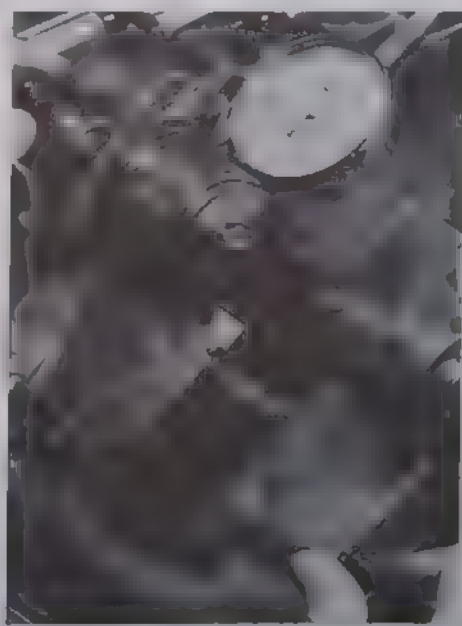
For some components, there may in any case be no choice. Few camera manufacturers can make their own printed circuits and electronic chips, or even mix their own plastics, and not many make their own glasses.

Component manufacture

Just as there is a hierarchy in the cost and versatility of materials, so there is one for manufacturing processes. Plastic mould-



Traditional methods for making and testing shutter curtains at the Leitz works, West Germany, are cost effective even today. Greater sophistication is expensive, and might have little effect on quality



Leitz/West at GMBH

workers. This keeps capital investment to a minimum, and although the cost may be higher in the long run, at least it comes in at a regular interval on the worker's payday. For this reason, a frugal approach is most appropriate when labour is cheap or when a company has little money to spare.

Contrary to popular belief, machine-made components are not inferior to those made by hand, given the accuracy and repeatability of machine manufacturing. They can be superior. They are more likely to undertake intricate and delicate fitting, and so they are, in effect, virtually an advance on the component tolerances.

Assembly

At the top end of the market, hand assembly may be preferred for a number of reasons. First, it is possible to select the best workers for the job, and to give them the best training. Second, the workers are more likely to be motivated, and to take pride in their work. Third, the workers are more likely to be experienced, and to have a good knowledge of the work. Fourth, the workers are more likely to be able to handle the work. Those who are not, will be left out. Hand assembly is often preferred for the price, though it is not the privilege usually appreciated why they are cheaper.

A major problem in the assembly of cameras is the need for a high level of accuracy. The system must be able to handle the work with precision, and to perform a simple repetitive task. The need for high accuracy is often offset by the need for high accuracy.

Because of the need for extensive quality control, the mass production of cameras is extremely expensive. The cost of the camera is often high, and the cost of the camera is often high. The cost of the camera is often high, and the cost of the camera is often high.

Because of the need for extensive quality control, the mass production of cameras is extremely expensive. The cost of the camera is often high, and the cost of the camera is often high. The cost of the camera is often high, and the cost of the camera is often high.

For certain types of cameras, as high speed production human inspection is impractical. Even on slower processes, there is the likelihood of boredom and inattention when so little ever goes wrong. These difficulties can be overcome by *batch inspection*, in which, say, one in ten cameras is inspected thoroughly, or automatic inspection of every camera.

Although almost every part of the mechanism can be tested automatically, some are easier to test than others. Electric components are very easily tested. A set of probes applied to the appropriate point can check both the shutter and meter. They are also easier to assemble than complicated mechanisms.



workers with their wheels, spindles, and equipment.

The drawback of automatic inspection is that they check only what they have been programmed for, and may miss obvious faults, such as broken or castings, which would be obvious to a human inspector.

The most serious drawback of automatic assembly comes when the camera is repaired. A camera may be dismantled and reassembled by hand, but by automatic assembly, the sequence of assembly is likely to be different. For example, the camera may be assembled in a different order, and the camera may be assembled in a different order. The camera may be assembled in a different order, and the camera may be assembled in a different order.

In a properly designed camera, the cost of the camera is often high, and the cost of the camera is often high. The cost of the camera is often high, and the cost of the camera is often high. The cost of the camera is often high, and the cost of the camera is often high.

In the final analysis, there are three types of cameras: good expensive cameras, good cheap cameras, and bad cheap cameras—there are very few bad expensive cameras. A good expensive camera is built of the best materials by a first-class workforce to meet the very

Work stations in a camera assembly hall receive components through overhead tubes, as well as partly assembled cameras, on to which sub-assemblies are fitted

Gloved fingers help to ensure that the camera's electronic components are not contaminated with grease and moisture while being handled during assembly

Electronic testing Using a meter that gives a digital readout, shutter speeds can be rapidly and reliably checked for accuracy merely by operating the camera

highest standards and go on meeting them for a very long time. It is a delight to use, and will stand considerable abuse.

A good cheap camera will meet the needs of its customers. At the top end of the market, it may resemble the good expensive camera closely, but there may be a few economies in the materials, but cost savings will come from ingenious design and highly mechanized assembly, but mainly from the economies of scale associated with a vast production run. It will not run as sweetly, and it may not last as long, but it will still be a very good camera. Further down-market, the camera has fewer features and, because it will be probably used less heavily, is less robust.

A bad cheap camera economizes on materials and inspection (but seldom paper specification), and although it may work well enough for a while, it may also be a problem from the start.



Improve your technique

Shooting the stars-1

Virtually any good camera will allow you to photograph many of the wonders of the heavens with nothing more than a sturdy tripod, a locking cable release and a good lens, coupled with modern films

Many people believe that photography of the stars requires the use of expensive and complicated equipment. In fact, the only equipment you need is a tripod, a locking cable release and a good lens. The key to success is choosing the right combination of conditions, lens, exposure time and film.

Long exposures

Among the easiest photographs to take are those which involve opening the shutter for a long exposure with the camera on a tripod. In this way, you can take night pictures of the sky and stars as a complete scene, which can then be used for a variety of purposes, such as a poster or a book cover.

The basic idea of this type of photography is to use the sky as the background, and the stars as the foreground. This is done by using a long exposure time, which allows the stars to appear as bright points of light against the dark background of the sky.

An exposure time of over 30 seconds will produce the star trails which are seen in the photograph. The direction of the trail depends on where in the sky you point the camera. If you aim at the celestial pole, the stars will trail in circles around the pole. If you aim at the celestial equator, however, the stars will trail in straight lines. Between these two extremes, the stars move in arcs.



Tropical night An exposure time of a few minutes at $f/2$ on Ektachrome 400 was sufficient to add star trails to this photograph of a Thai village

North polar trails This is an hour's exposure with a standard lens at $f/2$ on Kodachrome 64 film. Compare this with the south polar view on page 1568

Stormy weather Lightning is easiest to photograph at night when you can open the shutter for a minute or more using slow film. Kodachrome 64 film, 30 sec. $f/5.6$

Long trails Stars near the celestial equator trail with straight lines. Long exposures make the trails longer, rather than reveal much fainter stars

The celestial pole is located at the same altitude above the horizon as your latitude. In the UK, at about 50°N , for example, the pole is due north, at 50° above the horizon. An Australian, standing with the back to the horizon, will find the south celestial pole at 50° above the horizon to his right. The celestial equator is a great circle 90° away from these points. The star trails are within a degree of the north celestial pole, but there is no equivalent trail for stars in the southern hemisphere.

Leaving the shutter open for a minute or more will produce spectacular circular trails even on slow film. The camera can leave the shutter open for a longer time, but there are two snags. One is that any unwanted light in the sky may fog the film, and the other is that dew or frost may settle on the lens.

The only way to overcome the first problem is to select a very dark sky. Stopping down the lens from maximum aperture will simply result in fainter trails, though the results may still be worthwhile. As a guide, you can give more than an hour's exposure on 64 ASA

[illegible]

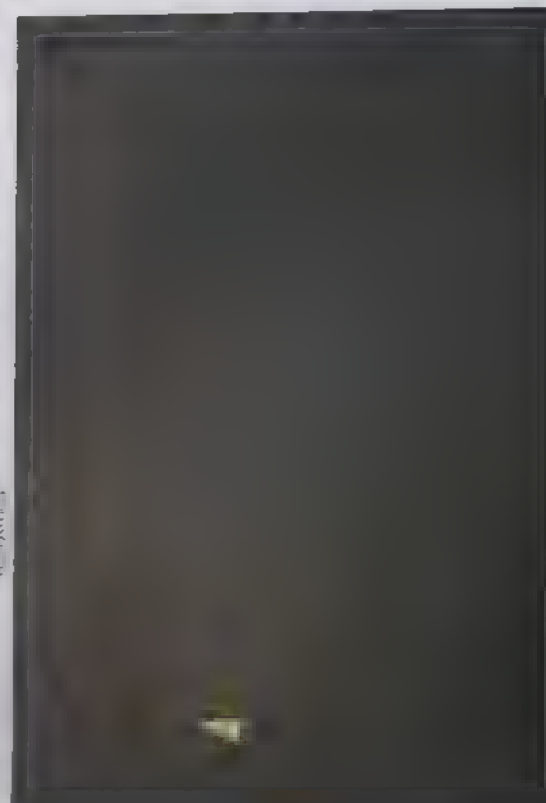
Dr J A L Cockcroft FRCR, FRCP, FRCR



THE UNIVERSITY OF CHICAGO

No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 84

Orion Star patterns are best shown on exposures of about 15 sec on a standard lens with 400 ASA film. Include detail in the foreground for added interest





Sunrise Unless the Sun is so dimmed by haze that you can look at it, never try to photograph it. 300 mm lens with 3x converter, 1/125 at f/16, Ektachrome 400.

Solar eclipse During total eclipse a brief exposure reveals the Sun's bright chromosphere. This 1/125 sec exposure was on Kodachrome 64 with a 400 mm lens.



about four seconds. On the other hand, if you're using a 300 mm lens with a 3x converter, 1/125 at f/16, Ektachrome 400 is a good choice.

For a total solar eclipse, a brief exposure reveals the Sun's bright chromosphere. This 1/125 sec exposure was on Kodachrome 64 with a 400 mm lens. The technique of preflashing, giving a prior exposure to weak light, may be used by professional photographers to reveal details in a scene. This is done by exposing the film to a very weak light for a short time before the main exposure. This helps to reveal details in the scene that would otherwise be lost.

completely black sky. The technique of preflashing, giving a prior exposure to weak light, may be used by professional photographers to reveal details in a scene. This is done by exposing the film to a very weak light for a short time before the main exposure. This helps to reveal details in the scene that would otherwise be lost.

Foregrounds are just as important in star photography as in everyday photography for interesting pictures. If the horizon is dark, you could try using a flashgun repeatedly to reveal nearby trees or buildings. It is worth looking for interesting buildings to show against a starry sky.

Sun, Moon and planets

With long focus lenses, you can photograph a number of solar system objects. The most difficult, oddly enough, is the

Sun—which is even potentially dangerous unless you take precautions. In this case, there is just too much light and you need a very good filter. If you're using a 300 mm lens with a 3x converter, 1/125 at f/16, Ektachrome 400 is a good choice. For a total solar eclipse, a brief exposure reveals the Sun's bright chromosphere. This 1/125 sec exposure was on Kodachrome 64 with a 400 mm lens. The technique of preflashing, giving a prior exposure to weak light, may be used by professional photographers to reveal details in a scene. This is done by exposing the film to a very weak light for a short time before the main exposure. This helps to reveal details in the scene that would otherwise be lost.

study the image using these filters. But there is always the risk that a filter will pop off, particularly if it is a minimum film stop. If this happens, the light from the Sun will go through into your camera and eye. Permanent damage to the retina is likely if this happens.

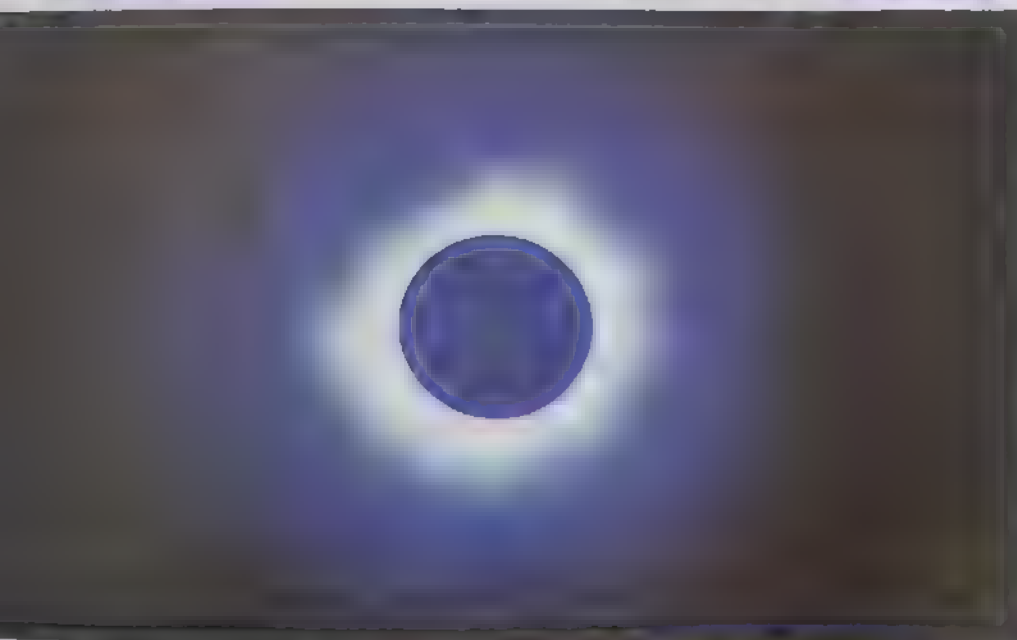
The Moon is a much safer and easier object to photograph. A lens longer than 400 mm will show some lunar detail. It is worthwhile photographing the Moon through its phases, from crescent to full. It is possible to use one or two stops of underexposure compared with the meter.



Twilight scene The Moon, Venus and the star Antares appear on this 1 second exposure on Kodachrome 64 at f/5.6, taken from Tanzania

Moon over Paris The Moon was entering an eclipse as this picture was taken. Exposure meters give fairly accurate readings for twilight photographs

Outer corona The same eclipse as at far left (February 1980) but with a shutter speed of $\frac{1}{2}$ sec. The inner corona is overexposed, but the outer corona well shown



regarded as a sunlit area. This is not a normal exposure for the Moon. The exposure is adequate. This, however, is modified by the Moon's altitude above the horizon—when it is low, particularly in misty conditions, much more exposure is needed. Furthermore the Moon's material is actually quite dark—about the reflectivity of volcanic lava—so bracketing the exposure is essential. When the Moon is a crescent, even more exposure is needed since its cratered surface is half filled with shadow and the reflectivity of the surface drops with increasing angle of illumination. Even so, photographs of a fairly thick crescent

Eclipses

Eclipses
Partial eclipses of the Sun photographed using neutral density filters, as in the case of photograph of the Sun itself. But in the case of a total eclipse of the Sun—very rare from any particular location—no filters at all are needed. During the interval, lasting only a few minutes, when the Moon completely covers the Sun, virtually

ready for the

very dark and even a long exposure on fast film at full aperture may not reveal it. A one second exposure at $f/4$ on 400 ASA film will, however, usually show the Moon's reddish disc during totality.

Printing for quality

With practice, most darkroom workers can regularly make satisfactory black and white prints. But to make every print to show quality, you must develop a rigorous technique and pay constant attention to detail

...the first step in the process is to select the best negative. This is not always the one with the most contrast, but the one that shows the most detail in the highlights and shadows. Once the negative is selected, the next step is to choose the paper. This should be done based on the type of print you want to make. For example, if you want a print with a lot of detail, you should choose a paper with a fine grain. If you want a print with a lot of contrast, you should choose a paper with a coarse grain. Once the paper is chosen, the next step is to make the print. This is done by placing the negative in the enlarger and adjusting the exposure time. The exposure time should be determined by the type of paper and the type of negative. Once the exposure time is determined, the print is made by placing the paper in the enlarger and exposing it for the determined time. The print is then developed in a developer solution. The developer solution should be changed regularly to ensure the best results. Once the print is developed, it is then fixed in a fixer solution. The fixer solution should also be changed regularly. Once the print is fixed, it is then washed in water. The water should be changed frequently to ensure the print is thoroughly washed. Finally, the print is dried. This can be done by hanging the print in a dry area or by using a drying rack.

...the next step is to select the best negative. This is not always the one with the most contrast, but the one that shows the most detail in the highlights and shadows. Once the negative is selected, the next step is to choose the paper. This should be done based on the type of print you want to make. For example, if you want a print with a lot of detail, you should choose a paper with a fine grain. If you want a print with a lot of contrast, you should choose a paper with a coarse grain. Once the paper is chosen, the next step is to make the print. This is done by placing the negative in the enlarger and adjusting the exposure time. The exposure time should be determined by the type of paper and the type of negative. Once the exposure time is determined, the print is made by placing the paper in the enlarger and exposing it for the determined time. The print is then developed in a developer solution. The developer solution should be changed regularly to ensure the best results. Once the print is developed, it is then fixed in a fixer solution. The fixer solution should also be changed regularly. Once the print is fixed, it is then washed in water. The water should be changed frequently to ensure the print is thoroughly washed. Finally, the print is dried. This can be done by hanging the print in a dry area or by using a drying rack.

Cleanliness

You can avoid errors by adopting a repeatable, organized routine for every procedure, so that even the minor, but still important, details become virtually automatic. To make every process repeatable the first essential is cleanliness. The darkroom needs cleaning at least as often as any other room. Do not forget the tips of safelights and cupboards. Use a vacuum cleaner rather than a brush to remove dust. Paper towels make dusting is better than avoid them. Keep plenty of clean cloths wet to dry your hands. Wash inside these at suitable points in your darkroom, near the sink, for example, so you do not let your hands drip as you approach dry work tops. Do not let any chemicals get on to the dry bench. Clean up any spilled processing solutions before they dry and become chemical dust. Always mix chemicals outside the darkroom so that no fine dust will contaminate it. Dishes and mixing vessels should all be labelled so that those used for developer are never used for anything else.

Each pair of tongs should be kept for its own solutions only. Although some cross contamination between stop bath and fixer may be tolerable, even a few drops in the developer will ruin it for quality work. When moving a print from the developer to the stop bath, pick it up



Washpan Careful control of the original exposure is only half the story: a good image often requires just as much care—perhaps more—during printing

by a corner to avoid kinking the paper, let it drain a few moments and then lower it into the stop bath—but let it drop at the end. In this way the tongs do not make contact with the stop bath and so there is no carry over back into the developer.

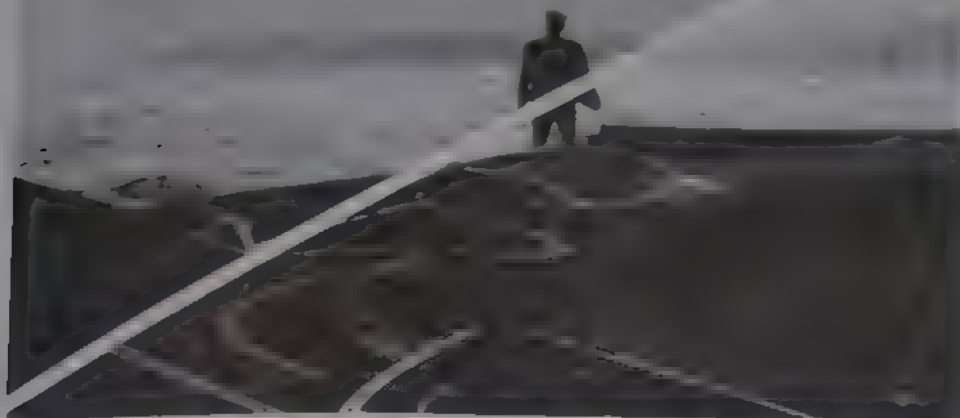
When you are organizing the darkroom try and make things easy for yourself. Arrange the dishes so that you do not have to move more than is necessary and try and set things up so that you can see each print while you are working on

the next one. Organize a suitable flow operation (see page 322).

Equipment check

Although it is possible to get good results from a poor enlarger—a good lens is essential, however—you will save yourself much time and disappointment if you get it into good order from the start. Check the steadiness and rigidity of the assembly (see page 308). Even the slightest movement during exposure will make sharp prints impossible.

If the enlarger is particularly prone to vibration you could try fitting a steady bar between the top of the column and the wall—but this is worthwhile only for a



Overdevelopment This shows the difference between an Ilfospeed print 'overdeveloped' for two minutes (upper left) compared to one developed 'normally' for one minute, both in Ilfospeed developer. The subtle tonal difference can be useful

heavy enlarger. A loose floorboard or a wobbly bench can make the best enlarger useless. If possible avoid moving about or touching the bench during exposure.

Now check the enlarger illumination and lens performance (see pages 1966 to 1969) and make sure that negative masking is efficient. The negative carrier should not permit even a glimmer of white light to pass through from the rebate of the negative. Any excess white light passing through the lens will degrade delicate highlight detail by causing flare in the lens.

Refined techniques

Although the starting point for a good quality print is careful choice of the type and make of printing paper (see pages 2236 to 2239), you can often get much more out of your paper by careful exposure and processing. There are no set conditions on how a print is made—every fine printer has his own personal procedure. But one of the ways fine printers manage to get such rich looking prints is by using a grade of paper that is slightly too hard for the negative. This gives an extra sparkle to the fine detail but has the unfortunate side effect of blocking up the shadows and the highlights. A little careful shading and burning-in then brings detail back to these parts to give a print with a feeling of depth and brilliance that could not have been made on the 'right' grade of paper.

The local exposure controls of the experts are basically no different from the usual dodging techniques. Plasticine, for instance, is very often used in place of card for dodging as it can be quickly shaped and pressed on to the end of a thin black wire. You can copy this idea—but use red or black plasticine to avoid reflecting unwanted light back on to the paper and, as with card dodging, keep the wire moving as well as the dodger.

When there are delicate areas to be dodged in a print, it may be preferable to do them all during the same single exposure. Another way of dodging may require more than one exposure, areas for the operator to move. A dark background may be desirable for very long periods of exposure, the red light source being used to keep the print in the dark. The operator may be required to move the print during the exposure, but this is not a problem for other areas. The operator may be required to move the print during the exposure, but this is not a problem for other areas. The operator may be required to move the print during the exposure, but this is not a problem for other areas.

There are many ways of dodging, in which the operator may be required to move the print during the exposure, but this is not a problem for other areas. The operator may be required to move the print during the exposure, but this is not a problem for other areas. The operator may be required to move the print during the exposure, but this is not a problem for other areas. The operator may be required to move the print during the exposure, but this is not a problem for other areas.

You can also adopt roundabout



Contrast control Prints for reproduction should, ideally, be slightly on the soft side. Printers sometimes use guides like this to control tones in reproduction

ways of dodging, in which the operator may be required to move the print during the exposure, but this is not a problem for other areas. The operator may be required to move the print during the exposure, but this is not a problem for other areas. The operator may be required to move the print during the exposure, but this is not a problem for other areas.

Using a timer

Fine printing depends on subtle nuance of tone, and so precise and repeatable exposure control is essential—particularly if you are producing a run of similar prints. If you time your exposure, watching a clock, no matter how careful you are, errors of up to half a second are liable to occur at the start and finish of the exposure. This is not good enough for first class work.

The best solution is an enlarger timer with it complete—and repeatable accuracy. A cheap and reliable alternative is a metronome. Although the switching operations are left to you, these allow you to time for shading and burning-in without taking your hand off the base-board. Most users set the 60 mark to give one beat a second but some prefer the increased accuracy of 100 beats to a minute. When using a metronome you must start the count with zero as you begin the exposure.

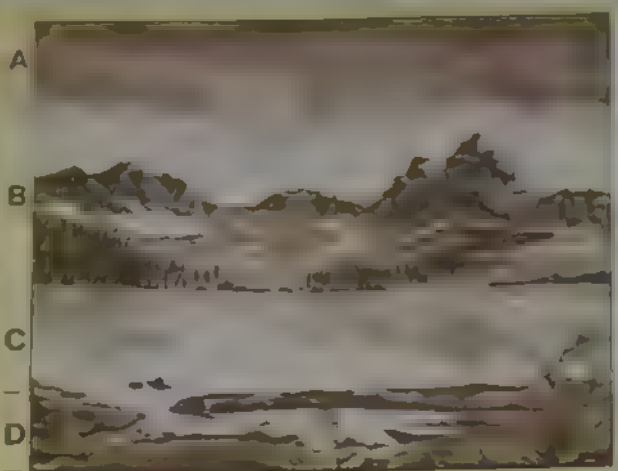
Print flashing

Annoyingly bright highlights and distracting detail such as bright reflections against a dark background can be removed or darkened by 'flashing' or localized *print flashing*. For this you need a small penlight torch with a black paper cone—or snoot—fitted over the end to give a small, dim pool of light. With the red swing filter in position beneath the enlarger lens you can then go over the print image painting out objectionable highlights or other details.

The technique does require some care—the flashed image is after all, only a grainless fog—and it is worthwhile making your own tests to establish maximum and minimum flashing durations, the ideal working distances, and the best size of snoot for your particular penlight torch.

Dodging sequences

The diagram shows a problem sequence. The top (A) requires, say, 40 seconds exposure to darken the top (A) compared to just 15 seconds to hold detail in the foreground (D). The main part of the scene (B) needs only 20 seconds but an extra 10 are needed for the middle-distance (C). There are numerous ways in which print this. One sequence would be to give 15 seconds, mask D, give another 25 seconds but shade B after 5 and C after a further 10 as you shade towards the top. Or time 40 seconds and shade D, B and C in turn.



print. The top (A) requires, say, 40 seconds exposure to darken the top (A) compared to just 15 seconds to hold detail in the foreground (D). The main part of the scene (B) needs only 20 seconds but an extra 10 are needed for the middle-distance (C). There are numerous ways in which print this. One sequence would be to give 15 seconds, mask D, give another 25 seconds but shade B after 5 and C after a further 10 as you shade towards the top. Or time 40 seconds and shade D, B and C in turn.

The diagram shows a problem sequence. The top (A) requires, say, 40 seconds exposure to darken the top (A) compared to just 15 seconds to hold detail in the foreground (D). The main part of the scene (B) needs only 20 seconds but an extra 10 are needed for the middle-distance (C). There are numerous ways in which print this. One sequence would be to give 15 seconds, mask D, give another 25 seconds but shade B after 5 and C after a further 10 as you shade towards the top. Or time 40 seconds and shade D, B and C in turn.

One easy method is to leave the negative in the enlarger at the printing height, at the same aperture, and to give your flash exposure through a piece of opal glass and a suitable neutral density, such as a 10 filter. You will have to experiment to find the best time, but try a quarter of the normal exposure as a starting point.

Development factors

The type of developer and its concentration has a great influence on image colour and quality. This is illustrated

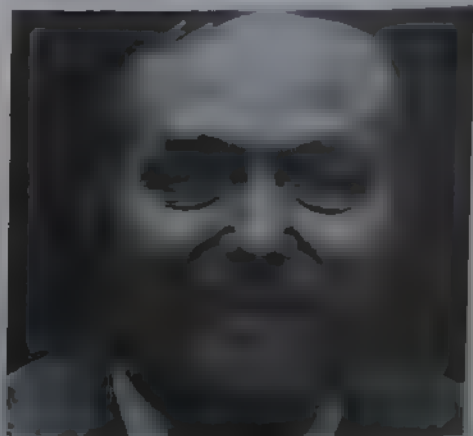
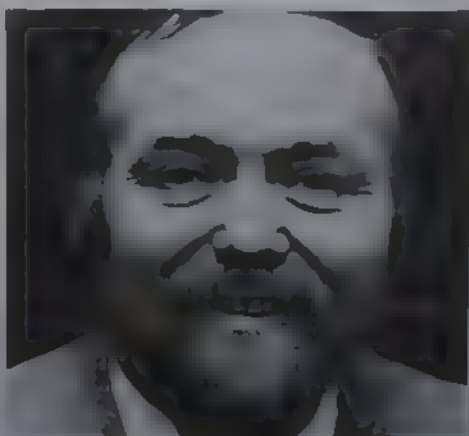
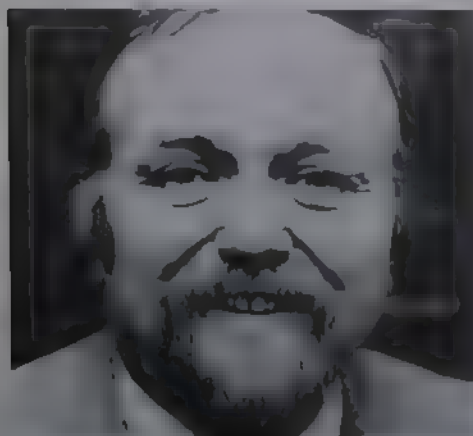
by the three prints shown. Most manufacturers quote a 'right' time for developing a print in a particular developer. Most of the time, however, the print is not developed to the 'right' time. The print is either underdeveloped or overdeveloped.

Although the 'right' time for developing a print in a particular developer is quoted, the print is not developed to the 'right' time. The print is either underdeveloped or overdeveloped.

Although the 'right' time for developing a print in a particular developer is quoted, the print is not developed to the 'right' time. The print is either underdeveloped or overdeveloped.

With some papers and developer quite a degree of contrast and tone manipulation may be possible by careful adjustment of both exposure and development times. There may for example be quite a difference between a print exposed for 20 seconds and

The right time? Although manufacturers quote a 'right' time for developing a print in a particular developer (centre) you may prefer to adjust exposure and development time between an image which is underexposed but overdeveloped (left) and one which is overexposed but underdeveloped (right)







Noise Abatement Society

Creative approach

IMPACT

It must be every photographer's aim to take a truly memorable photograph—a picture that makes people sit up and take notice. But just what are the qualities that give a picture impact?

Photos abound all around us in our everyday lives. Some are very good, but actually they do not attract attention. These are the photographs that stop you in your tracks and provoke an immediate response—whether at an exhibition, on an advertisement hoarding or on the printed page. What is it that makes these photographs stand out from the others—what is it that gives them impact?

While this question is difficult to answer directly, there are certain features that can be identified in a powerful image. Simplicity is one key quality—what is going on in the picture must be immediately apparent in this way. Colour, graphics, viewpoint, perspective and all the other pictorial elements that are dealt with in Creative Approach articles are all of great impor-

Jumbo A combination photograph made for Britain's Noise Abatement Society

ance in giving a photograph impact. These are certainly qualities worth striving for but success with any one of these elements—or, better, all of them combined, does not necessarily guarantee that a picture will have impact.

Impact is all of these things, yet it is equally a product of the subject itself, for instance, an action or a fleeting expression. The photographer is therefore never entirely in control and must be prepared to accept that the least controllable influence on a photograph—luck—plays an enormous role in giving a photograph impact. Even a shot having no colour and far from perfect composition can still have enormous impact—probably because of where the photographer happened to be standing and

This dramatic combination photograph was used by Britain's Noise Abatement society to aid recruitment and draw attention to the plight of people living close to airports.

The impact results from the careful combination of the two images in the final photograph. To have reduced further the gap between the house and the plane would have made the technique used obvious and robbed the overall image of plausibility. Increasing it, however, would have lessened the effect.

In a sense the photo is a lie—planes do not, as a rule, fly this close to houses. And yet this degree of distortion is necessary to get the photo's message across in the most direct and effective way.

Creative approach

what we can tell the viewer. New pictures in the photograph often have tremendous impact on the reader, but this is usually because the image is accompanied by a caption or headline that places it in context. However, when seen out of context by someone unfamiliar with the subject depicted, the image can have the same significance. It is the lack of context that makes the image so powerful.

Lines of colour *The seating area at Toluca football stadium, Mexico*

Imagine this picture without the figure. It would be fairly effective with the interesting combination of horizontals, broad curving bands of bright colour and two weak slanting lines. But with the figure it gains scale and human interest and has considerable visual impact. Had the figure been located more centrally the effect would have been reduced, but being off-centre, quite close to the golden mean of composition. Although the figure is small, the human form immediately attracts the eye, providing the shot with an evaluative impact.

abstracts shimmer into vivid images with imagination of techniques, lighting or fact.

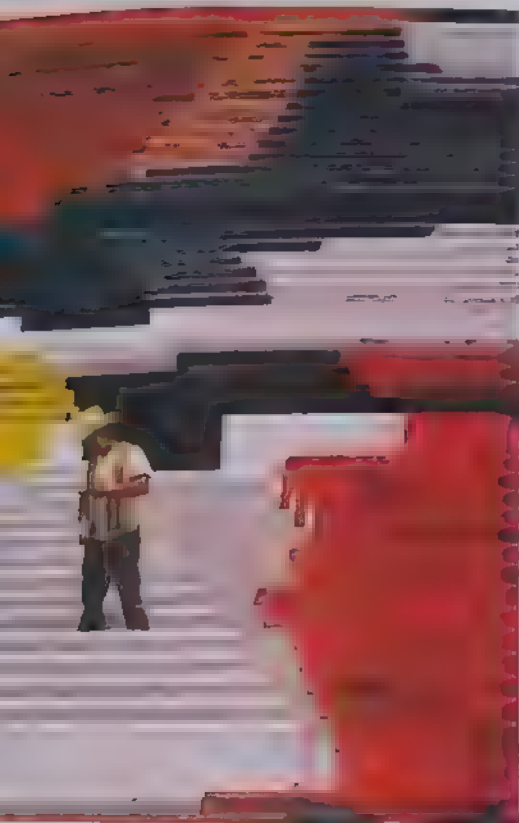


Rod Williams/Bruce Coleman Ltd

Monkey thoughts *A Red Uakari monkey, an inhabitant of the Amazon basin*

The monkey gazes straight into the camera in an almost human pose. Its eyes stare straight into ours, and much of the impact of this shot comes from seeing a monkey's face in close-up. The raised paw balances the composition and reinforces the animal's look of terror. But undoubtedly the image would be weaker in b & w—without the startling texture and colour of the face, the contrasting eyes would not be quite so riveting.





Tom Nelson Age 1 P T e l l i v



Vautier/de Nanx

Blitz St. Paul's towers over burning London, 30th December 1940

Blowing in the wind Taken on a Brazilian beach with a telephoto lens

This photograph of St Paul's cathedral in London was taken during the worst period of German bombing in World War 2 by *Daily Mail* photographer Herbert Mason. To get his shot, Mason had to display considerable courage, standing on a city roof during a heavy raid, focusing and releasing as different sections of London became visible through the gloom. Then a wind sprang up. Suddenly the cross, dome and towers of St Paul's stood out like a symbol in the inferno.

This shot is memorable not primarily because of its visual strength, though it is well composed, but because it was a first for the image was tremendously stirring for people in a war-torn country and indeed, still has some power even today. The point to remember about images like this is that the photographer's treatment of the subject is virtually irrelevant—providing the picture is clear, the subject speaks for itself. The photographer's skill—or luck—lies in realizing the potential of the subject.

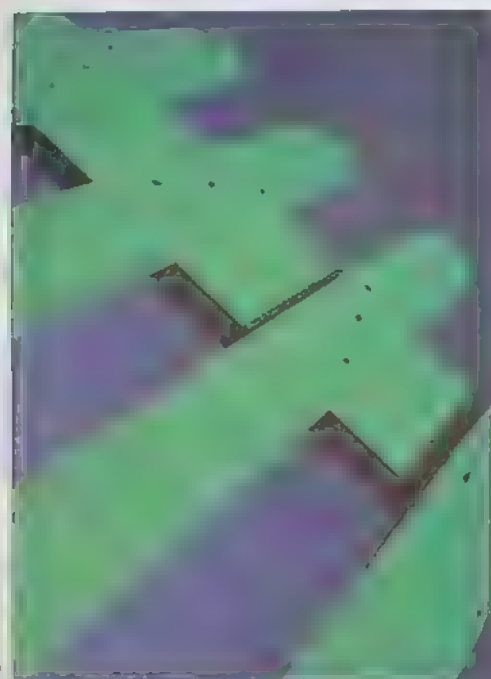
Popperfoto

Two elements are undoubtedly crucial to the success of this shot: the simplicity of the image, with the background plain and the figures almost in silhouette, and the dynamic pose of the two women—which the simplicity shows up well.

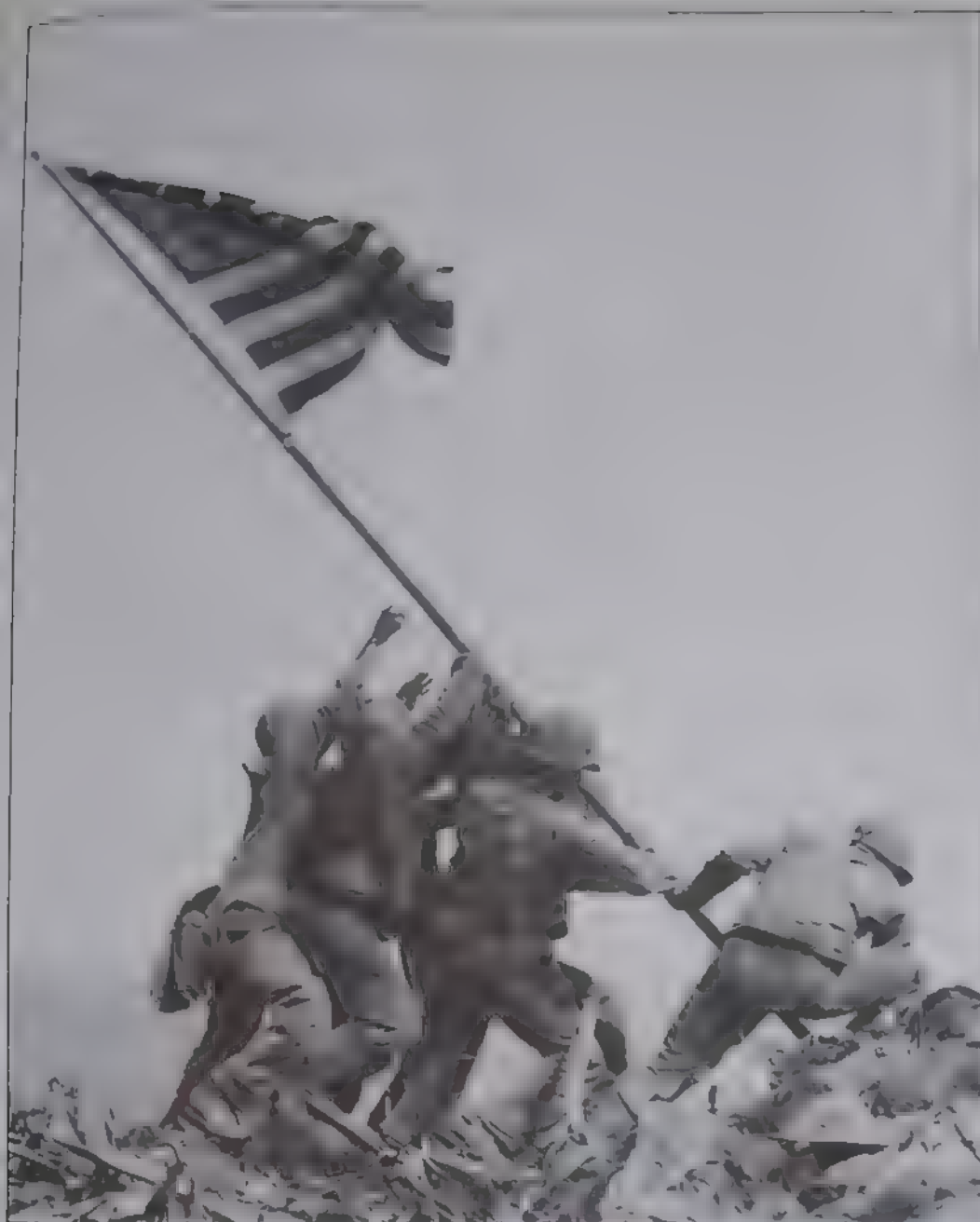
Perhaps the photographer was initially attracted by the fascination of the women carrying heavy loads on their heads and by the pleasant lighting. These features alone would have made a good shot. But, either through luck or skilful timing, the photographer has caught them at a perfect moment—as their legs bend in mid stride, as their arms come out to balance and, most importantly, as the wind catches their skirts—to make the shot a winner.

The outflowing skirts help to visually balance the women's loads, emphasize the similarity between their figures and provide strong, flowing diagonals to complement the uprights and horizontals—giving the shot a tremendous sense of fluid movement.

Green fence *An unusual viewpoint with strong composition and colour*



Buffalo boy *The aftermath of a ritual sacrifice by the Toradja people*



Jim Rosenthal Association of Press

Raising the flag A classic series of shots, taken on Mount Suribachi, Iwo Jima in 1945

Landscapes are the subject where it is virtually impossible to exert impact into the picture through history. The aim must be to capture as far as possible of a scene's natural grandeur. For this it is necessary to work out just why the scene has impact and to maximize the dramatic effect by concentrating on the features and suppressing others.

In this photograph the drama is essentially already present in the energy of the sky. To give prominence to this element the photographer has shot slightly upwards, using the dark foreground and mountains on either side to frame the sky with a strong curve. Slight but deliberate underexposure has helped in suppressing distracting details and in giving a richer sky



Moose's Jaw, Alaska *A carefully angled shot of a dramatic landscape*

Understanding...

Stereo images-1

Normal photos lack one vital feature of our view of the real world—the impression of depth. By presenting a separate image to each eye, stereo photography can restore this deficiency. But does it?

The human brain is remarkably adaptable and readily accepts a photograph as a good representation of reality. Yet a normal photograph lacks one vital quality of our view of the real world—the third dimension. Holograms may one day provide true 3-D images, but in the meantime, if we want an impression of depth and solidity, we must be content with the optical illusion of stereoscopic pictures.

The word 'stereoscopic' comes from the Greek word *stereos*, meaning 'solid', and *scopeo*, meaning 'I view'. Although it had been used occasionally before, the science of optics and the word was first applied to 3-D pictures by the eminent British scientist, Sir Charles Wheatstone, in the 1830s. And it is Wheatstone who is generally credited with the original idea of stereo pairs.

Wheatstone realized that an illusion of solidity could be created by looking at two drawings made from slightly different viewpoints, one with each eye. With the aid of a stereoscope, the brain can be tricked into thinking that the pair is a single 3-D drawing. Few artists had the skill to draw stereo pairs effectively, but Wheatstone's friend, Henry Fox Talbot (see page 215), suggested the idea of using pairs of calotypes. Not being a photographer, Wheatstone could not make the calotypes himself. But under his



The Bridgman Art Library

instruction, Henry Collier made a stereo portrait of the inventor of the computer, Charles Babbage, in August 1847, and stereo photography was born.

Seeing in 3-D

The basic idea behind stereo photography is to take two pictures from viewpoints corresponding to the position of each eye. Each eye is then presented with the appropriate picture to fool it into thinking that it is looking directly at the subject. Although this is simple in theory, the presentation of stereo pairs is much harder in practice.

The main difficulty is per-

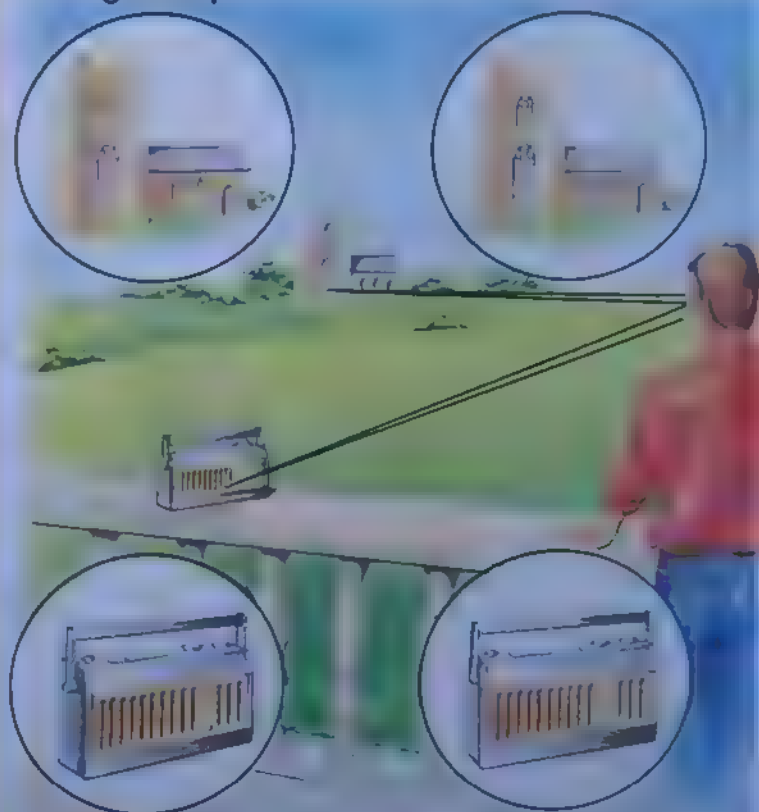
suading the eye-brain combination to see the stereo pair as a single image. When you look at a real object, both eyes turn in towards it so that the lines of sight from both eyes converge on the object. In this way, two slightly different images of the object are superimposed in the brain. Because for each eye the other eye sees 'behind' the object, we get the impression of depth. It is achieving this superimposition that is the big problem in viewing stereo pairs.

It is possible to view stereo pairs unaided providing they are printed correctly but it is very difficult. It is difficult

Victorian viewer based on the Brewster principle; using refracting eyepieces

to achieve this without causing eyestrain. When you look at a stereo pair, your eyes usually relax the eyes as if you are really looking at a single object—that is, deliberately deconverge the eyes. You see four images, both of the pair with each eye. Without concentration, the eyes cannot be focused together on the central two images while keeping the distant convergences, to fuse them into a single stereo image. But this combination of a low convergence for a distant object and a close focusing distance is unnatural, and causes eyestrain even if you can achieve it—few people can.

Seeing in depth



Binocular division With distant objects, the image seen by each eye is little different and the impression of depth is limited. With close-up objects, depth perception is more marked.

Separation for close-ups

For shots at this distance, much less separation is needed to give a good stereo effect and a base distance—the distance between the centres of the pictures—of about 20 mm is quite adequate.



mirror held between (see page 1472). convergence can be more natural. However, even this is not easy to achieve—partly because the eye has too wide a field of view and sees more than just the stereo pictures. So a viewer is normally essential.

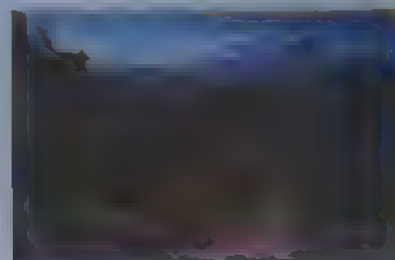
Stereo viewers

In Wheatstone's stereoscope, there were two mirrors, each set at 45° in front of each eye. The pictures could then be held at either side of the viewer so that the image from each one was reflected to the appropriate eye. This means that each eye sees only the image it is supposed to and a stereo effect is easy to achieve.

Unfortunately, the Wheatstone viewer still gives an unnatural combination of convergence and focusing, so prolonged viewing may cause eyestrain. Also, because mirrors reverse the image, the negatives had to be made in reverse. So the Wheatstone viewer never achieved widespread popularity.



The interpupillary distance of the eyes is not great enough to see relief thus far away but an unnatural



stereo effect can be achieved using a base distance of 80 mm or more

Nevertheless, Wheatstone type stereoscopes are still used for viewing Stereo X-rays because they can be used with any type of picture.

But it was Sir David Brewster's refracting stereoscope of 1849, based on Wheatstone's idea, that opened the way to the popularization of stereo photography during the 19th century. Instead of mirrors, Brewster used a pair of prisms side by side. The two pictures were placed some distance apart beyond the prisms, but the prisms bent the light from them towards the eyes so that it appeared that they were both in the

same place. The eyes can therefore converge and focus fairly naturally while still superimposing the images to give the stereo image.

Most subsequent viewers for the amateur are based on the same principle. However, instead of using prisms, they may use a combination of lenses and mirrors. The lens allows the pictures—usually slides—to be brought close to the eyes so that the image almost fills the field of view. Most of the cheap stereo viewers of the 50s and earlier used cheap, sometimes plastic lenses, and quality is generally inferior to earlier viewers.

Base distance

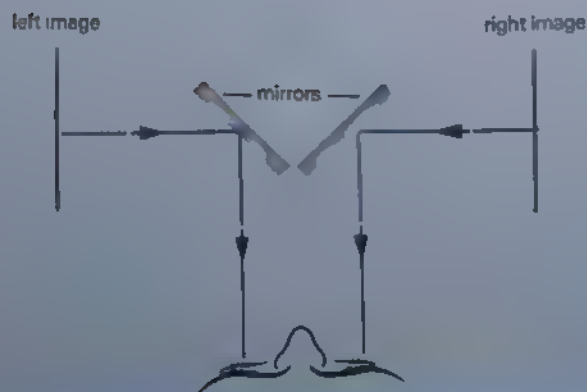
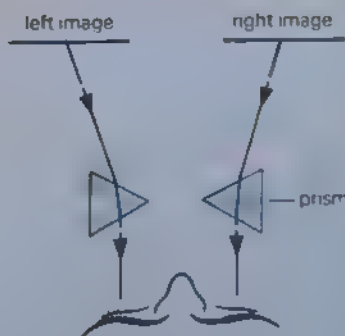
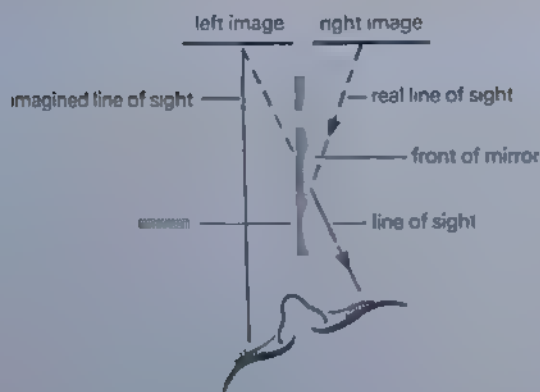
During the 19th century when stereo photography was first being used, the images should be—that is, the base distance. Distances varied immensely. A congress was held in 1859 to set a standard, and it was set at 70 mm.

Logically, the pictures should be the same distance apart as the interpupillary distance, which varies from person to person but is on average about 65 mm. For viewing stereo pairs unaided, then, theoretically the centres of the two pictures should be 65 mm apart. This limits the size of the pictures that can be used.

However, allow the images to be placed slightly further apart because they bend the light inwards—though the effective base distance is not altered. So with a refracting viewer, larger pictures can be used. But the maximum size is still limited and most stereo viewers of the last 40 years are designed for 35 mm slides.

The stereo effect varies with distance. With objects closer than a few metres, little

Stereo viewers



Mirror image (above left) The right eye is shown a mirror image of the righthand picture, printed in reverse. Because convergence is natural, the brain 'sees' just a single object, giving a stereo effect.

Brewster's system (above) for viewing stereo pairs presented the correct image to each eye through refracting elements that bent the light towards the appropriate eye. Most hand viewers use this system.

The Wheatstone viewer (left), showed each eye a mirror image of the right picture. The poor convergence-focusing combination may cause eyestrain, but the viewer takes very large images.

Improve your technique

Shooting the stars-2

Taking photographs of the night sky through telescopes requires skill and care rather than expensive equipment. Even with amateur means you can take successful pictures of mountains on the Moon or distant galaxies

THE IMPORTANCE OF MOUNTAIN ranges in the night sky is often overlooked. They are the most prominent features of the night sky, and they are the most common targets for amateur astronomers. The mountains of the Moon are particularly interesting, and they are the most common targets for amateur astronomers. The mountains of the Moon are particularly interesting, and they are the most common targets for amateur astronomers.

Telescopes

THE IMPORTANCE OF MOUNTAIN ranges in the night sky is often overlooked. They are the most prominent features of the night sky, and they are the most common targets for amateur astronomers. The mountains of the Moon are particularly interesting, and they are the most common targets for amateur astronomers. The mountains of the Moon are particularly interesting, and they are the most common targets for amateur astronomers.

THE IMPORTANCE OF MOUNTAIN ranges in the night sky is often overlooked. They are the most prominent features of the night sky, and they are the most common targets for amateur astronomers. The mountains of the Moon are particularly interesting, and they are the most common targets for amateur astronomers. The mountains of the Moon are particularly interesting, and they are the most common targets for amateur astronomers.

Camera view A less magnified view of the Pleiades, using a normal 200 mm f/3 lens. Five minutes on Kodachrome 64



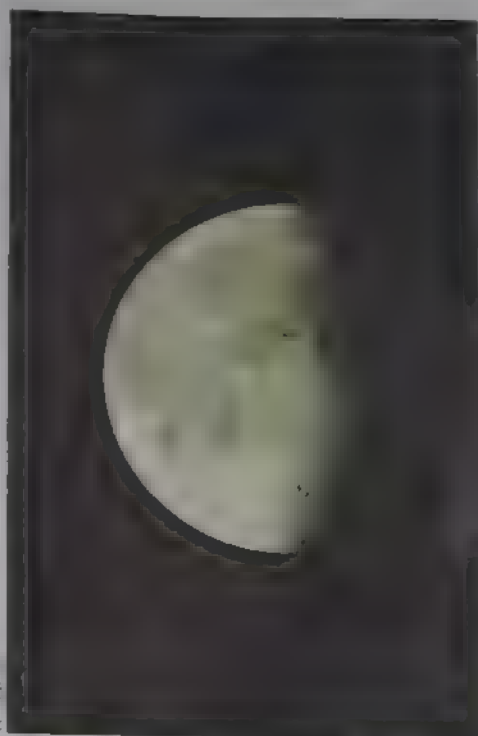
Through the telescope A 15 minute exposure of the Pleiades star cluster, 40 cm aperture, Ektachrome 200 rated at 400

THE IMPORTANCE OF MOUNTAIN ranges in the night sky is often overlooked. They are the most prominent features of the night sky, and they are the most common targets for amateur astronomers. The mountains of the Moon are particularly interesting, and they are the most common targets for amateur astronomers. The mountains of the Moon are particularly interesting, and they are the most common targets for amateur astronomers.

Eye-piece projection

useful both for increasing the magnification and hence image scale. This involves using an eyepiece or teleconverter or multiplier telescope-to-camera adapter designed to carry the camera body far enough away from the eyepiece that the image can be projected onto the film. This usually allows a camera to focus even if it cannot reach the prime focus, though it sometimes means using a very large image scale, with large images very prone to vibration.

With this method, a telescope with a focal length of 1200 mm may be used at $f/80$, with a focal length of 12,000 mm by using a 4 mm focal length eyepiece. This scale is actually much too large for most purposes, and can only be used for the Moon and planets when conditions are good. For nebulae and star clusters, prime focus photography is ideal.

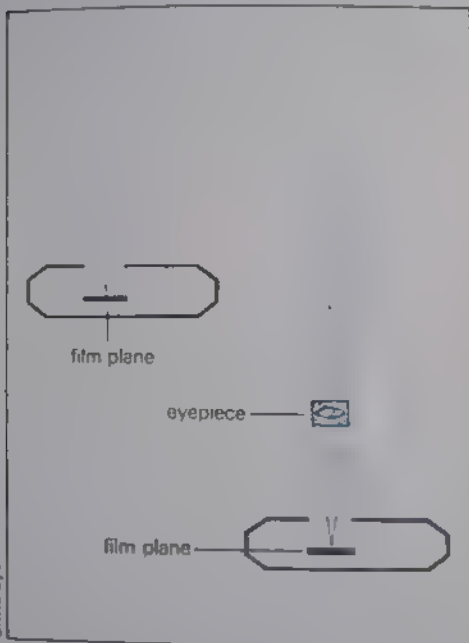


Lunar mountains

A 30 cm aperture telescope was used for this view, with an exposure time of one second on 2415 recording film.

Half Moon The Moon's surface always appears more interesting when side lit than when it is nearly full.

Sunspots Pictures like this require aluminized filters, as the Sun's heat can damage your eyes and camera.



Finding focus The camera can either be at the prime focus (upper diagram) or you can project the image (lower).

One common difficulty in astro photography is that of focusing the camera. Many focusing aids black out at large f -numbers, and even with a large telescope the image can be dim and hard to see. Some manufacturers offer less heavily matt focusing screens or even completely clear ones, in which case focusing by parallax (see page 1348) is needed. This is a difficult technique to use, and often a more successful focusing aid, which can be used with any focusing screen, is a viewfinder magnifier (see page 725).

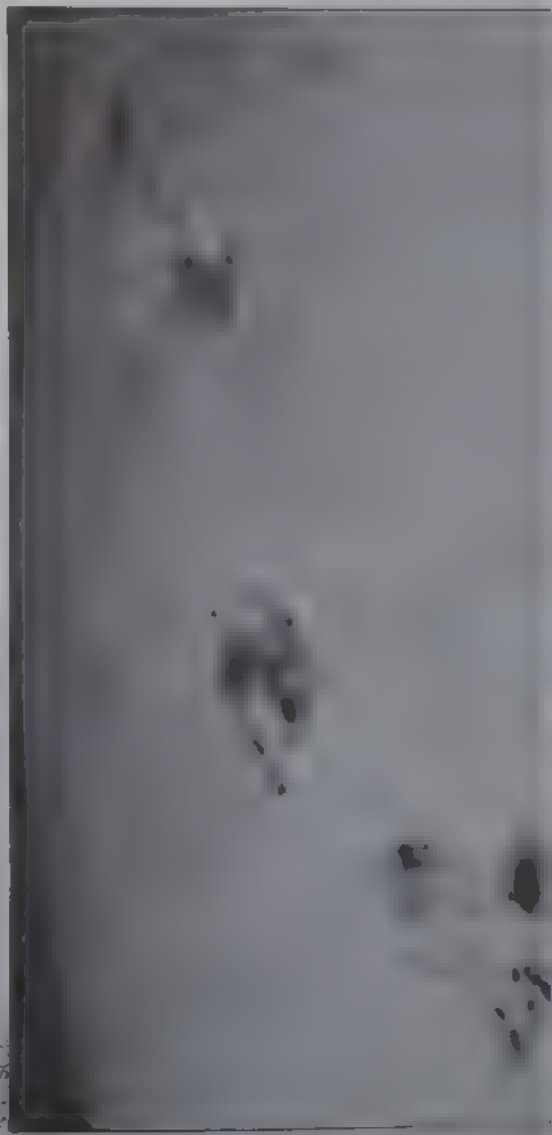
The biggest problem by far in astrophotography is keeping the telescope pointing at the object being photographed, since for faint objects

exposure times of many minutes are needed. Even with the Moon and planets, which are brighter objects, a few minutes exposure is needed if the telescope is mounted on an equatorial mount.

Small telescopes (10 cm or less) can suffer most from this, and it is best to remove the telescope from the mounting and fix it to a sturdy park bench (using for example rubber bands and V-shaped blocks of wood). This also overcomes the problems of vibration when a camera is mounted on the end of a small telescope, but it restricts photography to exposures much shorter than a second. For any longer exposures the Earth's rotation will cause the object being photographed to trail across the film. As a practical rule, for good, sharp image trailing will be noticeable if exposure longer than 1/15 second.

For objects in magnitudes 12 or fainter, being in second or longer exposures should be better than 1/5 second.

For most photography through the telescope, therefore, the telescope must be driven so as to counteract the Earth's rotation. Although people are tempted to use the simple *altazimuth mounting* found on all the cheaper telescopes, the only really practical method is *equatorial mounting* in which one of the axes is fixed parallel to the Earth's axis. This means that, to follow an object through the sky, you only need to make one movement rather than two as with altazimuth mounting. A further drawback of the altazimuth mounting is that even if you track an object perfectly its orientation changes as the Earth rotates, unless you happen to be at the Earth's





Prime focus (top) A 35 mm camera is attached to the prime focus of this home made 10 cm aperture telescope

equatorial point is at the centre of the circle. The telescope is pointed so that all the stars in the field of view are at the same distance from the centre. The telescope is then longer than the circle.

Equatorial mounts are made in a variety of types, with different mechanical features. The most common type is the 'off-axis' type, in which the telescope is mounted on a single axis. The telescope is then fixed pointing at the north pole (page 2442). Equatorial mounts are free from vibration and for astrophotography, the point

Piggyback Mounting your camera on top of the telescope allows you to use less precise guiding on the stars

of the telescope is at the centre of the circle. The telescope is pointed so that all the stars in the field of view are at the same distance from the centre. The telescope is then longer than the circle. When using a camera length greater than 100 mm, a surprise can be that objects appear to move through the sky, yet a slow motion is needed to keep them in place. A slow motion can only be achieved if the rate of turn is slow. The rate must be the same.

The most common way to drive a telescope is by using a synchronous motor which locks

Observatory A 25 cm reflector, complete with equatorial mount, guide telescope and drive correction system

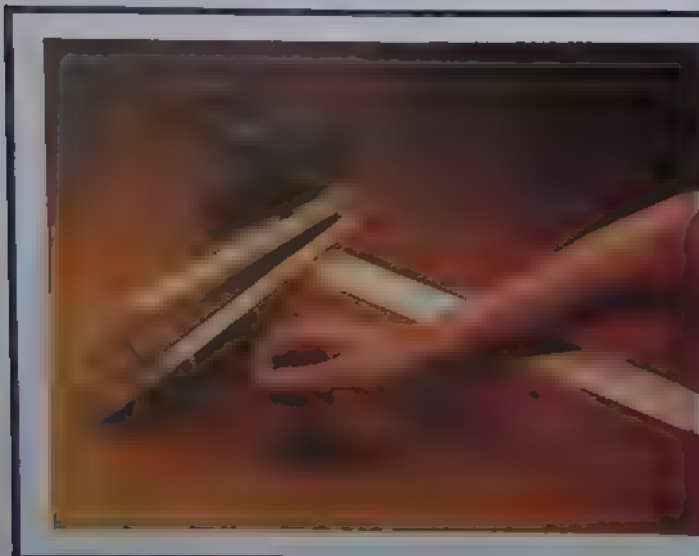
on to an AC frequency. Fine control can be provided by slightly altering the supply frequency using a *variable frequency oscillator*, usually with precision controls to make the rate go up or slow down slightly.

There are inevitably slight errors introduced by the alignment, the motor and wheel and even by the effect of refraction in the Earth's atmosphere, so some means of controlling the drive rate is essential for exposures longer than a few minutes. A *slow motion*, or fine control, on the other axis is also usually needed for the same reasons, though it is usually a hand operated system.

Guiding methods

When you are actually making an exposure using a driven telescope, it is generally impossible to look at the star image that is being photographed since this would prevent light from reaching the film. So another means of observing the sky has to be provided, so that the fine corrections to the drive rate can be made. There are two main ways of doing this. One is to provide a separate guide telescope, firmly fixed to the main telescope, of at least 2/3 the main instrument's focal length. The other is to observe with the main telescope but to view an object outside the frame.

This technique of *off axis* guiding is generally the most popular, though finding suitable guide stars is sometimes difficult. Both methods need an eyepiece with crosswires which can be illuminated faintly, known as an *illuminated*



Screw-driven mount The essence of this is a hinged board at the same angle as your latitude. The screw opposite the hinge is turned once a minute in time with the seconds hand of a watch. This means using a screw of 1 mm pitch 229 mm from the hinge. The wooden spar points polewards. In the southern hemisphere the hinge should be on the opposite side

A ... including also
A ...
A ...
B ...
C ...
D ...
E ...
F ...
G ...
H ...
I ...
J ...
K ...
L ...
M ...
N ...
O ...
P ...
Q ...
R ...
S ...
T ...
U ...
V ...
W ...
X ...
Y ...
Z ...

Taking the pictures

Then take the photographed star and find its position and location on the star chart. The telescope is stationary and the camera is attached to the map. This is available in this it shows the pattern of stars in the area. If not the object of interest has the object in the field of view. If the camera is already attached and check the focus. The camera is primarily focused by using the rack and pinion focusing device of the telescope itself. Next locate a suitable star in the guiding eyepiece. It may be necessary to move the object being photographed away from the centre of the field of view if you are using a very guiding.

[illegible]

Simpler methods

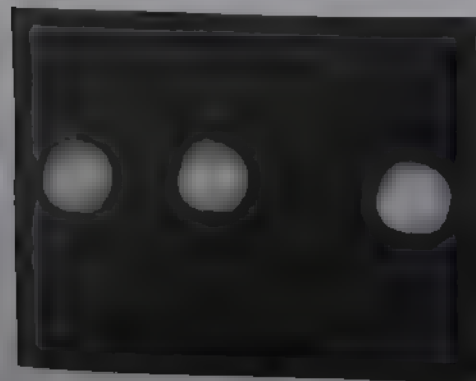
[illegible]

Films and special treatment

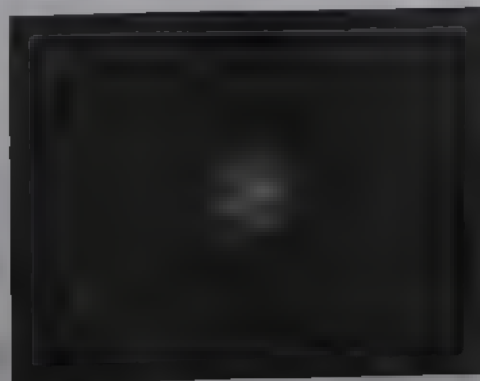
[illegible]

Your choice of film is dependent on the best format photographed. First films are most suited to "fast" extended focus shot as well as the 35mm. Still, however, the best choice for film, while that contrast is a little appropriate to the single frame, is the planets Kodachrome 124 color film. It is a little more white.

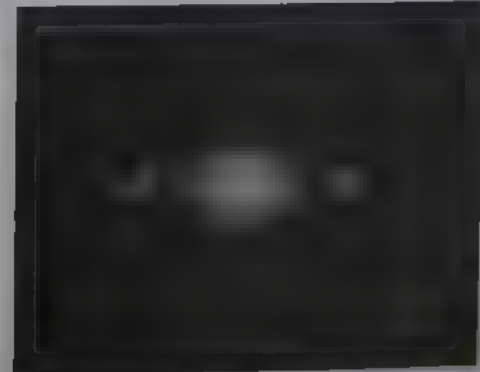
Exp. 1 features longer than 1 minute are of little use because of respiratory failure. There are however ways to improve the performance of the test, hypersensitizing is one possibility. But the test is possible only



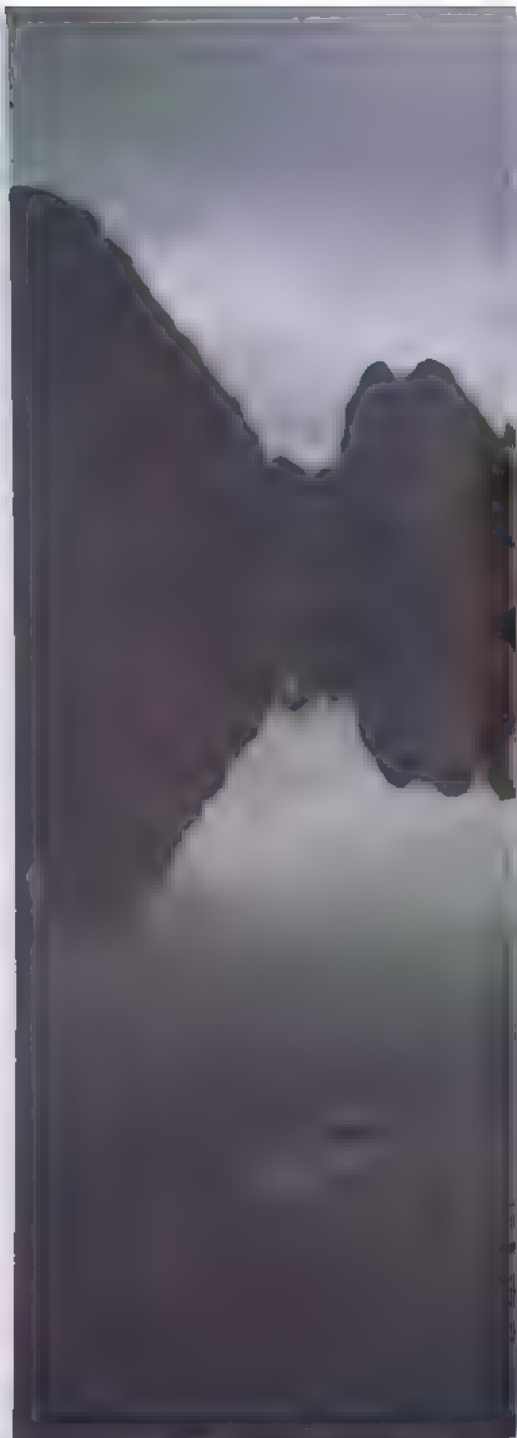
Mars Save film by putting several images on one frame. A 40 cm reflector was used, exposure time 1/5 second on 2415 film.



Jupiter This is a one second exposure on 2415 recording film with the 40 cm reflector, used at f/35



Saturn Again on 2415 film with a 40 cm telescope, the ringed planet needed a four second exposure



World of photography

Burt Glinn

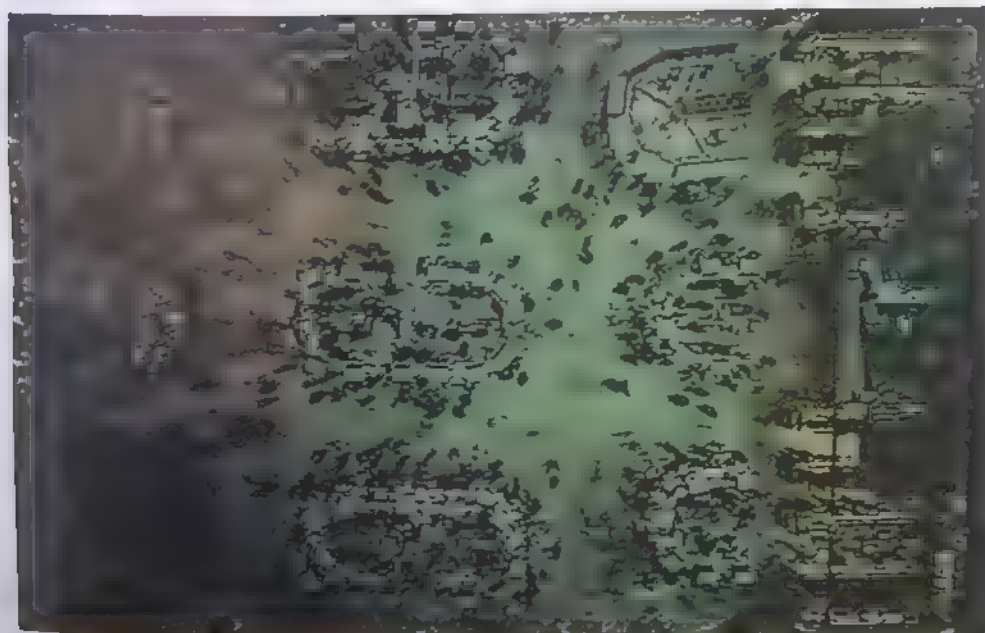
The art of finding a striking picture in an apparently dull situation has made Burt Glinn one of America's most famous commercial and industrial photographers

Few photographers have achieved such a wide range of subjects as the widely respected New York City-based Burt Glinn. His work covers everything from the most mundane to the most extraordinary. He has photographed everything from the most mundane to the most extraordinary. He has photographed everything from the most mundane to the most extraordinary.

A self-described "visual junkie", Glinn has a keen eye for detail and a sense of humor. He has photographed everything from the most mundane to the most extraordinary. He has photographed everything from the most mundane to the most extraordinary.



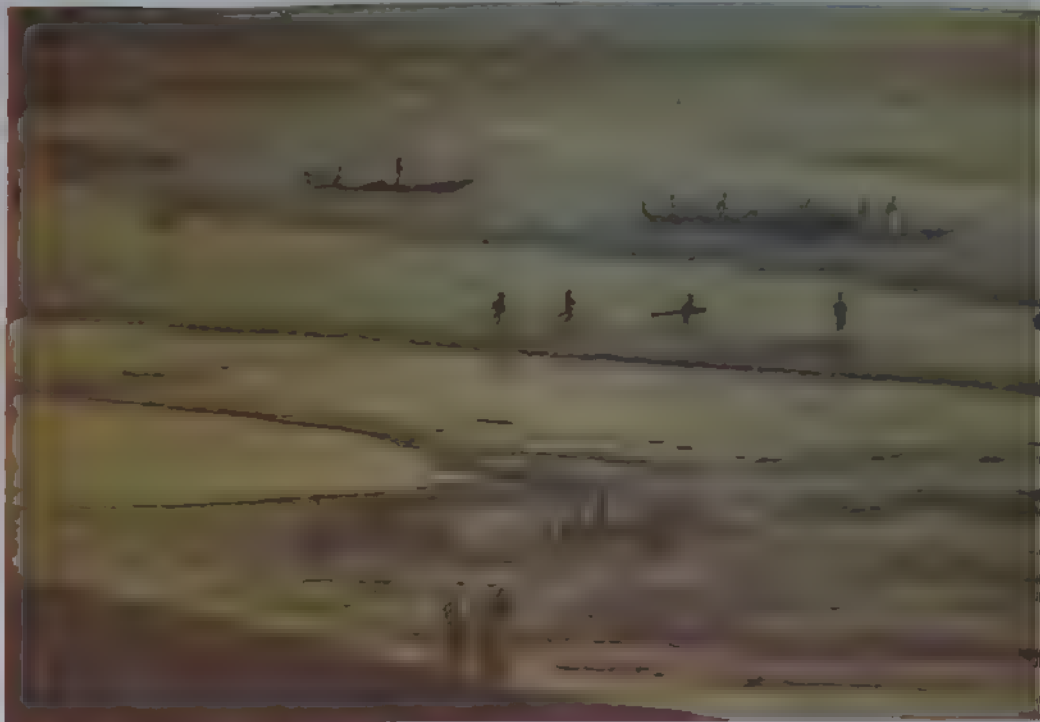
Burt Glinn travels extensively for over half of every year on assignment



Dry dock and a view of its interior for the first time. The photograph is a masterpiece of light and shadow, capturing the textures of the dock's interior and the silhouettes of the structures. The lighting creates a dramatic effect, highlighting the central object and the surrounding architecture.

Kweilin landscape A person carrying two large pots on a yoke across their shoulders, walking along a path that leads into a valley. The background is dominated by towering, jagged karst mountains that rise steeply from the misty ground. The overall scene is ethereal and serene, with soft light filtering through the haze.

The trading floor of New York's stock exchange shot by remote control, on a camera lowered through the ceiling.



Seashore on Bali Taken on assignment for 'Travel and Leisure' magazine for a story about Indonesia, Glinn travelled around the islands for two weeks

1. 1990年12月，在“中国—东盟”合作中，中国首次提出“中国—东盟”合作。

The first of these is the fact that the
 United States is a free country. It is a
 country where the people are free to
 express their opinions and to make their
 own choices. It is a country where the
 government is responsible to the people.
 It is a country where the people are
 free to live their lives as they see fit.
 It is a country where the people are
 free to work for the betterment of
 their country. It is a country where
 the people are free to live in peace
 and harmony. It is a country where
 the people are free to live in a
 world of freedom and justice.

He was the first to market for
the idea of a "Life" magazine. The day
after he left the office, he called and
told him to do it. He then
told the "Life" magazine that he
would sell his third story for *Life* as a
feature photographer he even got the
cover. He never did go back to Harvard
to study law.

Though working on *Life* magazine was an invaluable experience, Glinn feels that it was his association with the photographic cooperative Magnum that was responsible for his artistic development as a photographer. He joined Magnum in 1952, just five years after it was formed, and was to benefit from the excellence of photographic ideas that were current among its dedicated members. Here his colleagues were such illustrious and influential photographers as Henri Cartier-Bresson, Elliot Erwitt, and Marc Riboud—all to become very good friends. Their attitude

And photography influenced his
idea of what he calls 'a com-
monplace' design. He
likes to see a design in
the world. You learn that

front of you but also what is behind that. The design of the photo makes me come to the conclusion that I know who I am and what I'm doing. My pictures have to have content. I just information, not content and that kind of

On his work for a publication called *Holiday*, a large format, serious travel magazine that started working for it in the early 1950s and continued to do so throughout the life of the magazine. As one of their most important photographers, Glinn travelled all over the world developing the kind of essays that made *Holiday*, together with *Look* and *Life*, one of the major magazines of the United States. In addition to numerous assignments, he also produced two books with the writer Laurens Van der Post, one on Japan and the other on Russia, both published by *Holiday*.

Besides his work for *Holiday*, Ginn specialized in photojournalism during the 1950s and 1960s—covering events such as the Sinai War, Khrushchev's visit to America, Castro in Cuba, and the disturbances in Beirut in the late 50s. At that time he considered himself to be

computer but in the absence of a fully developed methodology for the analysis of the data, the results are not statistically significant. However, when the data are analysed using the methodology proposed by the authors, it is found that the probability of a subject being involved in a crash is significantly higher when the subject is wearing a mobile phone than when he is not. This result is in line with the results of other studies. However, this research is a preliminary study and requires the scope of this methodology.

Can't I rough it to my company reports the way that I am so interested in explaining things to people. And by explaining his company work as a challenge to be solved, he popularizes it among the rest of the firm of fresh ideas to his associates. Instead of being a collector of ideas, he is a producer. He is a part of the company. They produce ideas together, he is not a collector.

[illegible]

These essays have been subjects of varied as "ancient" research and the production of artificial body parts. All of them are related to the concerns of Bristol Myers. But by approaching them with the attitude of a photojournalist, Glinn has achieved some remarkable results. For the essay on artificial body parts, Glinn hired a researcher and then photographed a varied set of pictures—

[illegible]

1. The first step is to identify the problem. In this case, the problem is that the system is not working properly.

Each report period may vary anywhere between ten and twenty days to complete. This is not necessarily worked on consecutive days. Rather than a week

Silhouette This dramatic shot for the Bristol Myers annual report was taken in a dark corner of a plant making artificial hip joints
105 mm lens



Bali monkey dance *Glinn captured this emotional moment at one of the many religious festivals that take place all over Bali throughout the year*

For the 10,000 francs that was offered to the woman, she refused to sell. She said she would like to see the picture first. She was told that it was a part of the world that she had never seen before. She said she would like to go to the place where the picture was, although she was told that it was a very dangerous place. She said she would like to go there, but she was told that it was a very dangerous place. She said she would like to go there, but she was told that it was a very dangerous place. She said she would like to go there, but she was told that it was a very dangerous place.

ment is normally three
the lenses, ranging from a
mm. He also takes enough film



Lens design

No lens can fit every bill and, in creating a new lens, designers must carefully play off a variety of features, such as speed and compactness, to achieve a product that matches the photographer's needs precisely



Designing a lens must satisfy a range of criteria

When a lens is designed, the designer must first decide on the type of photography it will be used for. This is because different types of photography require different lens specifications. For example, a lens designed for sports photography must be able to focus quickly and accurately, while a lens designed for landscape photography must have a wide field of view. The designer must also consider the size and weight of the lens, as well as its cost. Once these factors have been considered, the designer can begin to create the lens. This involves a series of calculations and experiments to determine the best combination of lens elements and coatings for the intended purpose. The final result is a lens that is designed to meet the specific needs of the photographer.

Angles of view

The angle of view of a lens is the angle between two lines that originate from the optical center of the lens and extend to the edges of the frame. This angle is determined by the focal length of the lens and the size of the sensor or film. A lens with a short focal length will have a wide angle of view, while a lens with a long focal length will have a narrow angle of view. The angle of view is an important consideration when choosing a lens for a particular type of photography. For example, a wide-angle lens is ideal for landscape photography, while a telephoto lens is better suited for sports photography.

Long, wide, fast, slow Manufacturers produce a vast number of lens designs to give the variety of specifications demanded by different types of photography

that the retina of the eye is a curved surface. This means that a lens that is designed to focus light on a flat surface will not focus light correctly on the retina. To compensate for this, lens designers use a series of curved lens elements to create a lens that can focus light correctly on the curved surface of the retina. This is why lenses are designed with a specific curvature. The curvature of the lens is determined by the focal length of the lens and the size of the sensor or film. A lens with a short focal length will have a wide angle of view, while a lens with a long focal length will have a narrow angle of view.

lens only 1 mm thin (or requires a simple Tessa-
tion, which limits the max-
to about 1/2.8. Faster 1
and must therefore 1.
length. A typ.
ultra fast f/1.
find a length.

[illegible]

I have found a few more things.
S. M. C. (C. S. M.) - I have found a few more things.



With focal length shorter than 10 mm the barrier earth will be already compared with a wide lens. This no dependence was reported by the Leitzöfema for 80 years as glass microscope design. Contrast important feature was also

[illegible]

At the time of the ...
... ..



Keeping a close check on specifications helps to ensure that the lens is within the limits intended by its designer and user



Lens resolution is assessed on a large screen (about 3 m in front of the lens), on to which a grid (above) is projected by the lens



Precision assembly

maximising the accuracy of the assembly process

Speed

Courtesy of Canon (UK) Ltd

the aperture diaphragm is the most critical component in the lens. It is the aperture diaphragm that controls the amount of light that passes through the lens. The aperture diaphragm is made of a series of thin, flexible leaves that are arranged in a circular pattern. The leaves are made of a material that is resistant to wear and tear, and they are designed to open and close smoothly. The aperture diaphragm is a key component in the lens, and it is the aperture diaphragm that controls the amount of light that passes through the lens.

It is the aperture diaphragm that controls the amount of light that passes through the lens. The aperture diaphragm is made of a series of thin, flexible leaves that are arranged in a circular pattern. The leaves are made of a material that is resistant to wear and tear, and they are designed to open and close smoothly.

Aperture diaphragm The leaf design has proved to be reliable and convenient, so it is used universally

the aperture diaphragm is the most critical component in the lens. It is the aperture diaphragm that controls the amount of light that passes through the lens. The aperture diaphragm is made of a series of thin, flexible leaves that are arranged in a circular pattern. The leaves are made of a material that is resistant to wear and tear, and they are designed to open and close smoothly. The aperture diaphragm is a key component in the lens, and it is the aperture diaphragm that controls the amount of light that passes through the lens.

A lens aperture can be checked by comparing the diameter of a light spot on film printed with the standard aperture

the aperture diaphragm is the most critical component in the lens. It is the aperture diaphragm that controls the amount of light that passes through the lens. The aperture diaphragm is made of a series of thin, flexible leaves that are arranged in a circular pattern. The leaves are made of a material that is resistant to wear and tear, and they are designed to open and close smoothly. The aperture diaphragm is a key component in the lens, and it is the aperture diaphragm that controls the amount of light that passes through the lens.

the aperture diaphragm is the most critical component in the lens. It is the aperture diaphragm that controls the amount of light that passes through the lens. The aperture diaphragm is made of a series of thin, flexible leaves that are arranged in a circular pattern. The leaves are made of a material that is resistant to wear and tear, and they are designed to open and close smoothly. The aperture diaphragm is a key component in the lens, and it is the aperture diaphragm that controls the amount of light that passes through the lens.

the aperture diaphragm is the most critical component in the lens. It is the aperture diaphragm that controls the amount of light that passes through the lens. The aperture diaphragm is made of a series of thin, flexible leaves that are arranged in a circular pattern. The leaves are made of a material that is resistant to wear and tear, and they are designed to open and close smoothly. The aperture diaphragm is a key component in the lens, and it is the aperture diaphragm that controls the amount of light that passes through the lens.

the aperture diaphragm is the most critical component in the lens. It is the aperture diaphragm that controls the amount of light that passes through the lens. The aperture diaphragm is made of a series of thin, flexible leaves that are arranged in a circular pattern. The leaves are made of a material that is resistant to wear and tear, and they are designed to open and close smoothly. The aperture diaphragm is a key component in the lens, and it is the aperture diaphragm that controls the amount of light that passes through the lens.

the aperture diaphragm is the most critical component in the lens. It is the aperture diaphragm that controls the amount of light that passes through the lens. The aperture diaphragm is made of a series of thin, flexible leaves that are arranged in a circular pattern. The leaves are made of a material that is resistant to wear and tear, and they are designed to open and close smoothly. The aperture diaphragm is a key component in the lens, and it is the aperture diaphragm that controls the amount of light that passes through the lens.



depth of field. The depth of field is the distance between the nearest and farthest objects that are in acceptable focus. The depth of field is a function of the aperture, the focal length of the lens, and the distance to the subject.

It is much easier to focus with a wide aperture rather than a narrow aperture. The wider the aperture, the less the depth of field. The narrower the aperture, the more the depth of field.

Many photographers use a wide aperture to get a shallow depth of field. This is useful for portraits and other subjects where you want to isolate the subject from the background. A narrow aperture is used for landscape photography where you want to keep everything in focus.

There are two main types of focusing mechanisms. The first is a helical focusing mount. This is the most common type of focusing mechanism. It consists of a series of interlocking gears that move the lens elements forward and backward as the focusing ring is turned. The second type is a bellows focusing mechanism. This is used in some large format cameras. It consists of a series of bellows that expand and contract as the focusing ring is turned.

There are also two main types of lenses. The first is a simple lens. This is a single piece of glass that focuses light onto a point. The second type is a compound lens. This is made up of several pieces of glass that are designed to work together to focus light. Compound lenses are used in most cameras because they can provide a wider range of focal lengths and apertures than simple lenses.

Close focusing

A standard lens can be designed to focus on objects at a wide range of distances. However, some lenses are designed to focus on objects that are very close to the camera. These are called close focusing lenses.

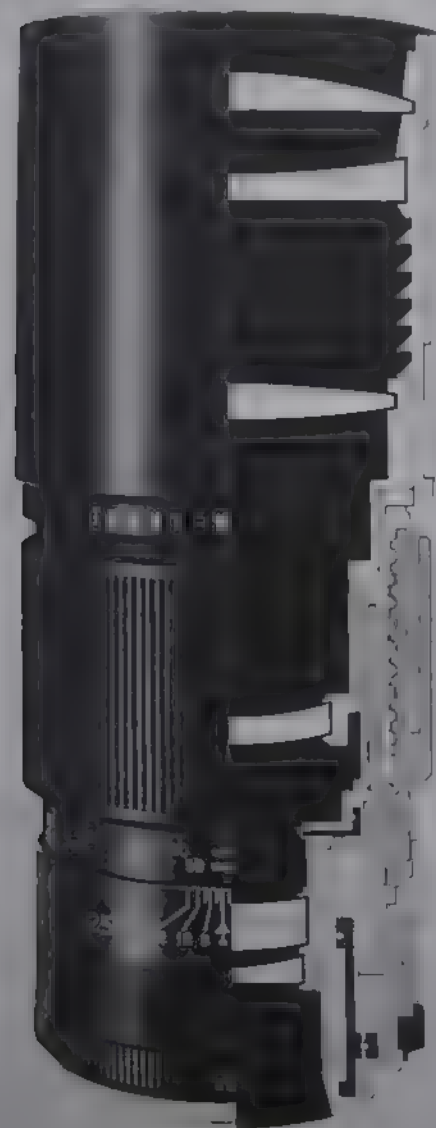
The main advantage of a close focusing lens is that it allows you to get very close to your subject. This is useful for macro photography and other types of close-up photography.

Many photographers use a close focusing lens to get detailed shots of small objects. This is useful for scientific photography and other types of photography where you need to see fine details. A close focusing lens is also useful for portrait photography where you want to get close to the subject's face.

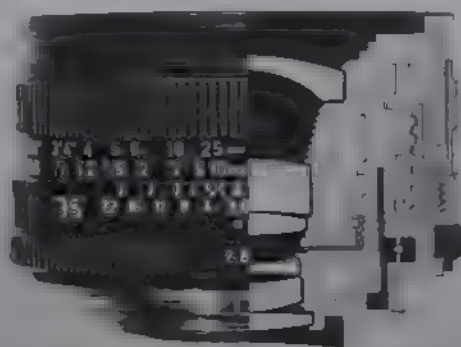
There are two main types of close focusing lenses. The first is a macro lens. This is a lens that is designed to focus on objects that are very close to the camera. The second type is a close-up lens. This is a lens that is designed to focus on objects that are close to the camera, but not as close as a macro lens. Close-up lenses are often used for portrait photography and other types of photography where you want to get close to the subject.

When using a close focusing lens, it is important to be careful of the depth of field. Because the lens is focused on a very close object, the depth of field is very shallow. This means that only a small portion of the image will be in focus. To get the most out of a close focusing lens, you need to use a small aperture and focus carefully.

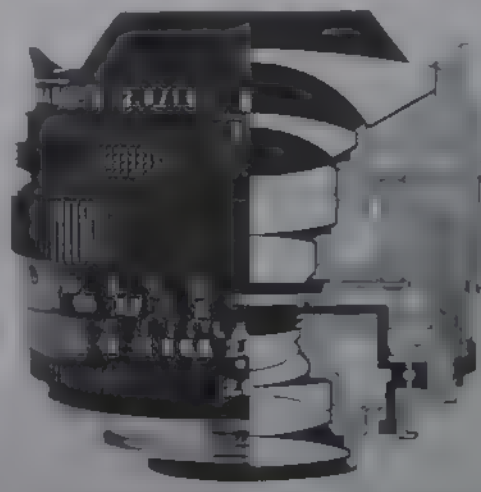
Close focusing lenses are very useful for a wide range of photography. They allow you to get close to your subject and capture fine details. However, they also have some limitations. The most important limitation is the shallow depth of field. This means that you need to be very careful when using a close focusing lens to make sure that the part of the image you want to focus on is in focus.



The Leitz Telyt-R 250 mm f/4 employs a helical focusing mount to achieve a focusing range from infinity to 1.7 m



The Leitz Elmarit-R 35 mm f/2.8 offers high contrast and excellent resolution, even when used fully open



The Leitz Elmarit-R 16 mm f/2.8 is a fisheye (note the built-in hood) that gives an image right into the corner of the frame

Preserving your old photos

Valuable old photographs must be restored by a professional, but fading snapshots from the family album can be given a new lease of life by a combination of gentle cleaning and copying techniques



Copying a black and white print Rather than attempt chemical work on valuable collector's items such as these autographed but mass-produced publicity prints, make copies using yellow or blue filters over your camera or enlarger lens

Most people have one sort or another of your own early prints, or your parents, for who have been lost. Or you enough to discover some genuine prints inside secondhand books, attic, or perhaps a box of negatives.

If you do come across any old prints be extremely careful when handling them and, if you have any suspicion at all that they might be of historical value, take professional advice. Old photos are very fragile and easily damaged and you should never attempt to restore anything of value yourself. Restoration is very skilled work calling for years of experi-

ence. If you are not sure, it is simply a nice picture—there are a number of steps you can take.

All too often these old photographs are in poor condition through careless storage or inadequate fixing in the first place. You might think that the best thing would be to treat them chemically, but in fact this is often the worst thing you can do. For example, in a box of faded glass negatives, silverfish and other pests may

have eaten and soiled the emulsion, making them appear fogged or with dirty highlights. If you try to clean them up by bleaching, a chemical reaction may start between the bleach solution and the deposits on the emulsion, making holes in the photo.

So chemical treatment of the photo is out of the question. Indeed, you should handle the original as little as possible. Keep the photo in subdued lighting as much as possible and never expose it to direct sunlight for any length of time. Usually, however, you should be able to



Rescuing an old negative A treasure trove of old negatives may reveal those which are scratched, badly stored or simply suffering the effects of age—such as the 'bloom' of dichroic fog, or yellow stains. This one was carelessly masked

Cleaning an ambrotype Although each one is an 'original', ambrotypes were produced in their thousands. Some may benefit from cleaning and rebacking, before being remounted in their original frames. This example has a painted backing



clean the photo very gently. But do not wipe them with harsh cloths or damp rags—use soft, lint-free cloth or a blower brush to remove surface dirt. Before you do anything more, make a straight copy (see page 1121) so that, should the original deteriorate in any way, you have a permanent record.

If, after gentle cleaning, the photo is still in rather poor condition, you may wish to do something to improve the image a little. In this case you can make a second copy and work on this rather than the original. You may even be able to make the necessary adjustments while making this second copy.

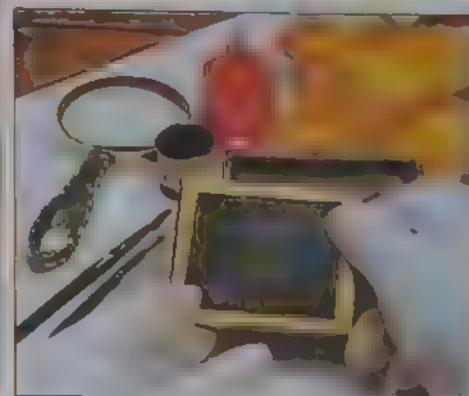
Making copies

For stained or faded originals, copying is by far the best method of recovering the image. Using your enlarger (see page 1171) or copying set-up (see page 944) you can produce duplicate negatives and positives and, by careful control of exposure and development, you can increase or decrease the contrast. You can even improve on an original monochrome image by copying it producing a bromide print and hard colour print. This obtains a coloured print from what may have been a faded, torn and forgotten original.

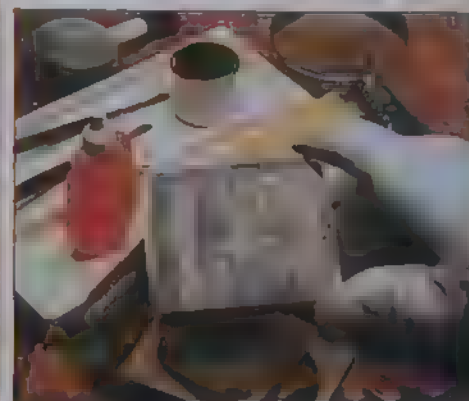
Many of the negatives were quite large. If you have one that is too big for your enlarger, and you do not have a light box, so cannot make a back copy, you could always use a large sheet of ortho-chromatic film to produce a duplicate positive—or negative—by contact printing. Use your enlarger as a controllable light source by racking the head and negative carrier up to the top of the column. This gives the widest spread of light. You can cover the enlarger lens with a piece of greaseproof paper to diffuse the illumination.

If an ortho-chromatic film, allows tray development, side lighting, which gives a greater contrast, over the image contrast during development. If your original has got fixer stains on it or has yellowed with age, you may need to use a yellow filter when copying it on ortho-chromatic film.

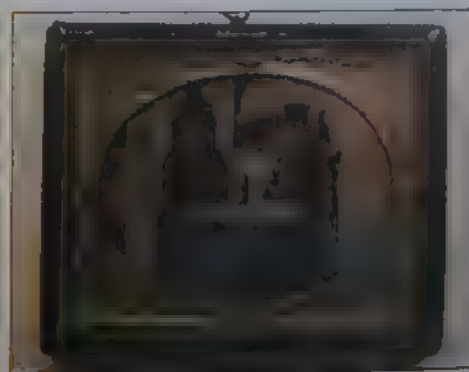
You can hide cracks or tears in an original by careful application of your retouching skills to the duplicate negatives and prints. For example, if you have a scratched and tarnished tintype (also called a ferrotype but not to be confused with ferrotyping the term applied to glazing) you should start off by copying it



1 Carefully prize loose the frame and pressings of the ambrotype. Notice the painted black backing has failed here



2 Remove dust, grime and the flaked backing using spirit-based cleaner. Restore the backing using black paint



3 When the backing has dried, reassemble the ambrotype using the original frame and decorative pressings



1 Use tepid water or a spirit-based cleaner and very gentle brushing to remove surface grime such as sticker gum



2 Use a hardener presoak—or refix—if further chemical work is needed before washing, drying and remounting



3 A print can then be made before storing the negative in a proper negative bag. Or a copy negative can be made

Darkroom

with polarizing filters over the lenses and camera to reduce glare. Your final print will be free of blemishes. If blemishes can't be removed more easily, you can opt for retouching clear spots on the copy negative, then do the print.

An enlarger to print always helps in these situations.

For the technical quality of an image, a certain authenticity of character and subtlety of tone may be lost in the process when you use today's high-speed film. The solution is to use the copy negative to make a new print on papers using old-fashioned processes, such as bromoil printing (see page 104).

transparency film to preserve the quality and character of the original. This method is

a safety precaution before attempting to replace the backing. An alternative method is to make a colour print from a

Ambrotypes and daguerreotypes

Ambrotypes and daguerreotypes are early photographic processes. Ambrotypes were first made in 1839 and daguerreotypes in 1839. They are both made on glass plates. Ambrotypes are made by coating a glass plate with a light-sensitive emulsion and then exposing it to light. Daguerreotypes are made by coating a glass plate with a light-sensitive emulsion and then exposing it to light. Both processes are now obsolete, but they are still used by some photographers for artistic purposes.

Print and image preservation Although a century-old photo such as this albumen print may be a highly prized feature of your collection, it needs careful restoration before it can either be handled and displayed, or kept with other work

em

When a

composers used to print out of using black felt or paper

re than w
the film
identical

A second method is to use a non-water-based film cleaner. This is a chemical solution that is used to clean the film. It is used by dipping the film into the solution for a few seconds. This method is used by some photographers for artistic purposes. The old chemical method of cleaning film is still used by some photographers. It involves using a solution of potassium permanganate and sodium bisulfite. This solution is used to clean the film. It is used by dipping the film into the solution for a few seconds. This method is used by some photographers for artistic purposes.



1 The first step when working with a potentially 'significant' or valuable image is to make a copy image—just in case something goes wrong



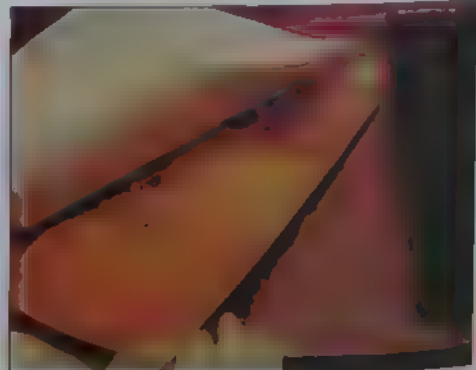
2 Clean the print very carefully with a non water-based film cleaner—and not water since this would swell and soften any emulsion. Use cottonwool swabs



3 Remove the print from its mount only if you feel that this will improve its chances of long-term survival—and if it comes away easily. Take care not to cut the print



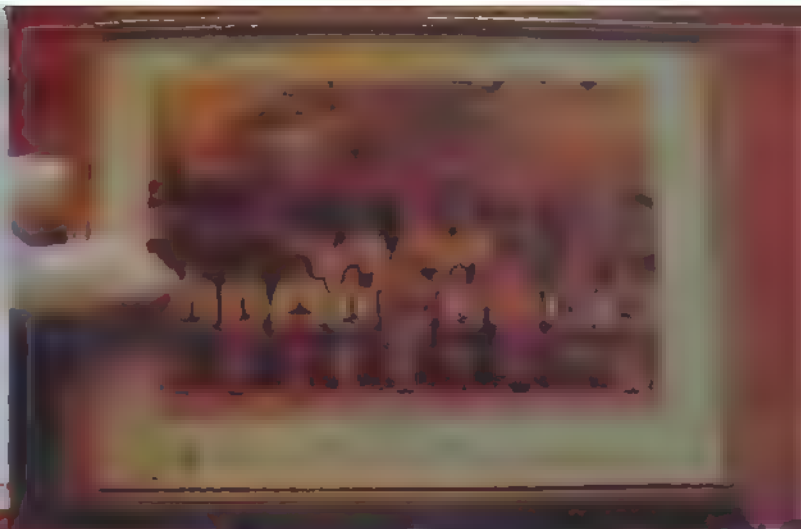
4 Remount the print after removing any traces of its former mountant. Use 'dry' methods. Make a clean copy of the print if you wish to display it



5 For storage, place the original in a folder of acid-free paper inside a suitable print box. The box should be kept somewhere cool and dry

Precautions

School photo Colour
photographs of
children, many of
which were
taken in the
1950s. The
example is
faded, stained and
dirty—definitely not
the sort of picture for
the family mantel
piece or piano top
in its original
condition.



1 Start by unframing the photograph—some types are pinned together, others are taped. Take care not to damage either the frame or the backing board



2 You may find that much of the dirt and grime which spoils the picture is in fact on the cover glass, so clean this using a moist cloth of soapy water or spirit



3 Also clean the print, using a swab loaded with film cleaner, ready for copying and reframing. Notice the fading where the print has been uncovered.



4 The fading on this 20 year old colour print has affected the cyan content of the image—confirm this by looking through viewing filters



5 Make a copy negative through a weak (05, 10, 15 or 20) cyan filter. Make sure the copy film is balanced to the exposing light. Use this to make a copy print.

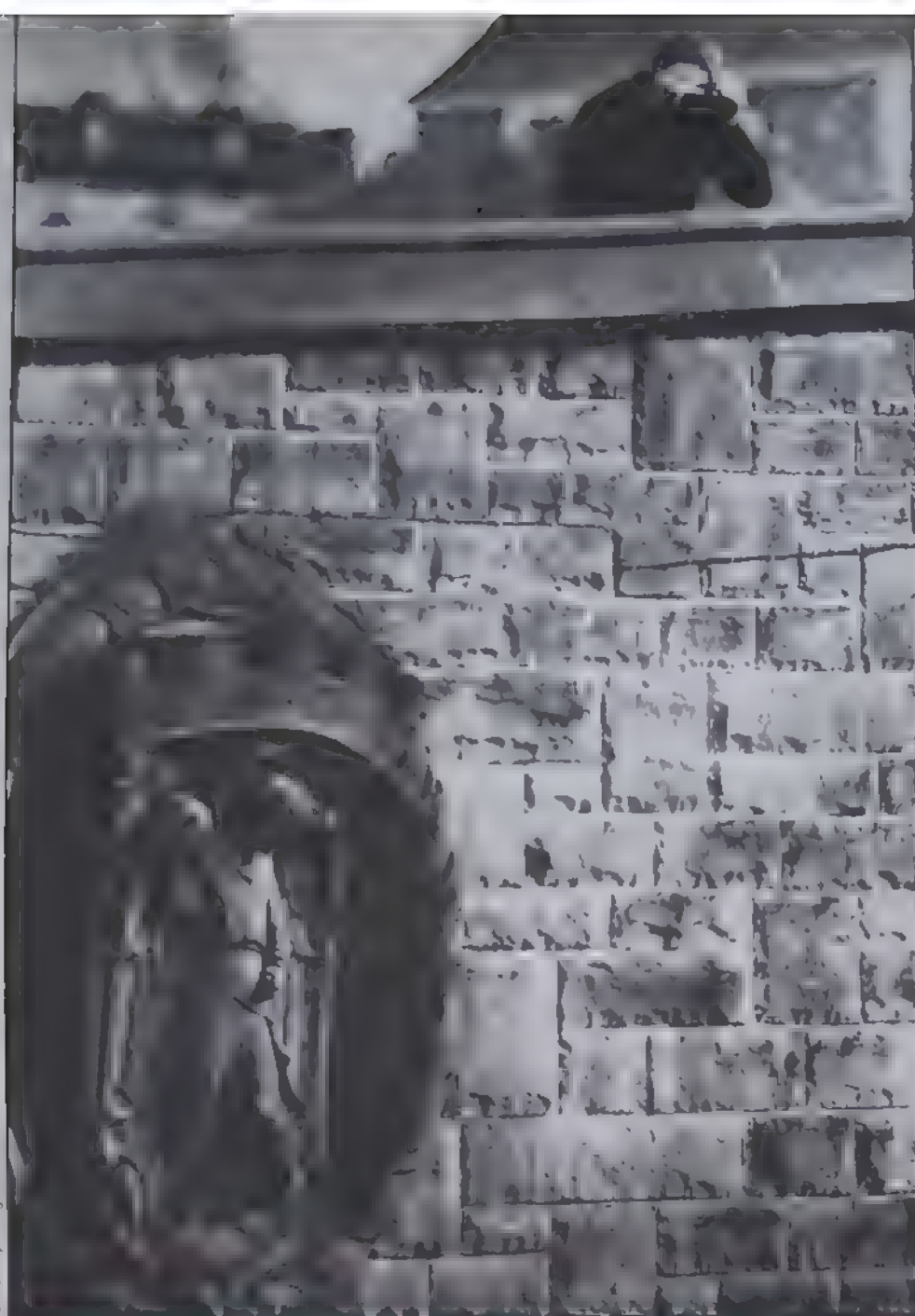


6 Mount the copy print and remount the original before framing. The original can then be put away for safe storage while the copy can be used for display

Fogs and stains

[illegible][illegible]

When you have finished your work, print the image placed by you on a piece of paper. Number the page 1246. If it is defective or defective, it will be in the instances you should thoroughly wash the print before selenium or sepia toning. If it is poorly washed then patchiness will result. In all cases, before attempting treatment it is wise to make a copy of the original in case the image is spoilt in the process. Remember also that old photographs are often fragile and those fading originals could be lost for ever if not treated with great care during restoration or copying.



Corner Ian liked the shapes of the road and buildings at this corner and waited for over an hour until passers-by completed the composition. Even then he was not entirely happy with the shot, calling it 'a near miss'. **Bridge** While taking photos of Coke cans rusting in the river, Ian looked up and spotted the man on the bridge. The relation between man and statue made the shot and Ian grabbed it on a 350 mm lens, hand held at a fairly high shutter speed

TOWN SCENES

Ian Berry specializes in making extraordinary photographs of ordinary people. These shots from a day in Dumfries show what a quick eye and great patience can make of an everyday town

Ian Berry, one of the photographers in the elite Magnum Agency (page 117), gained widespread fame a few years ago with the publication of *The English*, a record of ordinary English people and their lives. Recently, for a slightly different angle, he spent a day in Dumfries in the south of Scotland.

'I had read about the town before going,' he says, 'and I started by looking for basic photos of local landmarks such as Robert Burn's grave. These planned shots, however, came to nothing and I ended up just wandering the streets.'

Ian's equipment has to be light and quick to operate so he uses a combin-

ation of Leica and Olympus lenses with 28, 35 and 50 mm primes in his 35 mm camera, with which he uses rarely but carries around as a spare.

As a rule, Ian doesn't spend several days getting the feel of a place and trying to see it in depth, finding out what people do, how they spend their time. With just one day available I tried to assemble a selection of photos which would give a good 'surface impression' of the town and its people.

While wandering through a new location Ian uses a combination of two basic techniques. Firstly, he keeps a camera constantly ready for a situation which

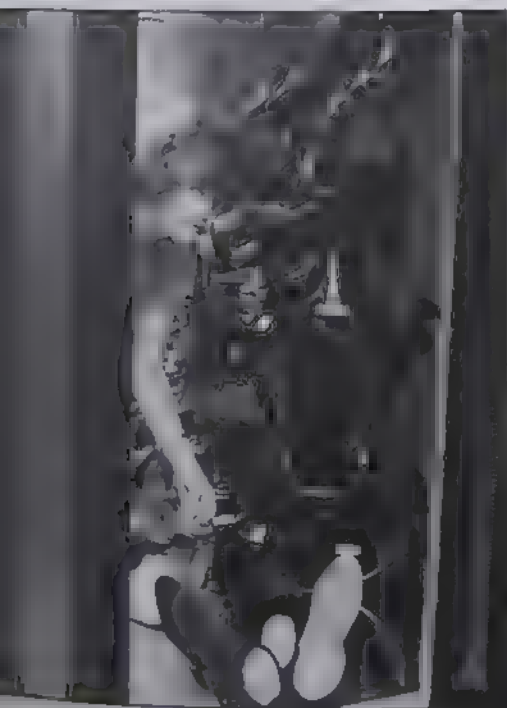




Junction The jumble of street signs and road markings at this junction of a small town amused Ian but a focal point of some kind was needed. The boy poked his head out to look at Ian and the composition clicked into place

Shoe shop This photograph calls for two completely different responses. The viewer is drawn to look at the street scene but is at the same time being watched by the shop-assistant. The overall effect is deliberately unnerving

House The photo is made by the contrast between the wavy lines of the road and the rugged solidity of the house. The two solitary figures heighten the feeling of isolation





Bicycles Ian saw the potential in the collection of basic shapes, circles, squares and triangles which fill the frame, and shot when the man's posture made another shape of his legs, linking him to the scene and completing the composition

Stetson The peculiarity of a Stetson in Dumfries caught Ian's eye immediately. This mark of the oil boom, a new style in an old town, adds humour to the series. Unexpected shots like this always complement the more evocative photos

suddenly pre-occupied with the idea of a photograph before it was too late. The idea of a photograph is a unique idea. Ian finds a man standing on a street, waiting for as long as he can. It could mean an hour or more, but he is willing to wait to complete the photograph in his mind.

Ian found the town of Dumfries, a small town with a river and his sombre reputation in the photographs he took.

'It has a beautiful river but it is so deep in cans. It could have been a lovely town but it seemed uninteresting. I was willing to make the most of its potential.'

While yearning after exotic locations and grand events, it is easy to neglect the photographic potential in ordinary scenes and ordinary people. Many of these photos might seem unremarkable to the average inhabitant of Dumfries but to people living in different environments they provide an interesting study of a people's everyday life. And this is an interest which will increase rather than decrease with the passage of time as social historians in the future look back



What went wrong? LEAVES

Whether fresh and green or autumnal and coloured, leaves make good photographs. Ian McKinnell comments on four varied attempts



When a photograph depicts something with a personal or social significance we may tend to view it in a slightly different way. This photo depicts cannabis and this fact may influence some people's reaction to it. In this shot the photographer has taken a straight shot of the plant rather than drawing attention to its use (perhaps by using distortion to suggest hallucination) but poor technique has lessened its impact. While we can see that the plant has beautiful colouring, the shot has been poorly framed. The all-important central area is simply a hole, and the best example of foliage, at bottom centre, has been brutally pruned. I would have closed in on this, looking for shapes and patterns and excluding ugly details such as the wall in the background.



Of the two plants shown in this photo, the one on the left is the more interesting. It has a more direct, vertical shot, but its light colour would have masked the delicate texture of the shot. The other, less lighter, framing at the top, part way on the left, would have avoided the distracting ragged edge. Also, the photographer should have stopped the lens down further so that the whole shot was sharp. As it is, the leaf at the front, perhaps the most important element in this subtle composition—is fuzzy.



I find this photograph messy and cluttered. The two main elements—the fern and the heather—fight against one another and one's attention wanders between them. It would have been better to decide which was the most important and concentrate on that. For example, the photographer could have moved the fern to a better background or perhaps even taken it home to photograph at leisure. Photographing things where you find them is not always the best approach. If you can, try taking some of the things you find back with you. But please be careful what you pick as many wild flowers



This could have been a much better photograph but the photographer has failed to exploit the high potential of the subject matter. Most immediately noticeable is the banal composition, bisecting the image and leading the eye straight out of the picture—this could almost be two unrelated shots joined together. The rich colouring of the brick wall and the riotous conglomeration of the leaves both offer promise but juxtaposed in this way they fail to complement each other in any way. The most interesting area for me is where the red stem joins the sycamore leaf, with its fascinating variations in texture and colour. I would have used a macro lens to exploit this classic example of complementary colours, clearing some leaves from the background to emphasize shape and using the harsh light to bring out the colour and texture.



Improve your technique



Precision exposures-1

Most photographers are satisfied with less than perfect exposure, but the extra sparkle that marks out a spot-on exposure makes all the extra effort needed for precision worthwhile

most of the popular
dramatic so people tend not
po
photo-
tend to just look
for perfect
need to take
worth looking at a
which could improve your
technique and so improve
These range from simply
film to getting to look

Statues Giving a shorter exposure than that recommended by a TTL meter can help to retain the maximum shadow detail possible without burning out highlights

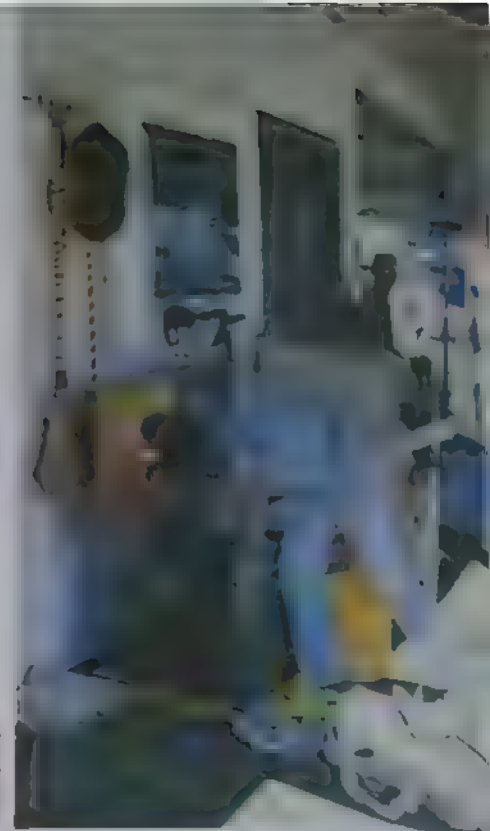


Silhouette There is often no 'right' exposure—it is for the photographer to decide whether he wants shadow detail, or a strong silhouette

Changing speed

A common mistake is to use a shutter speed that is too slow for the subject. This can result in a blurred image, which is often not what the photographer wants. To avoid this, it is important to choose a shutter speed that is fast enough to freeze the action. A good rule of thumb is to use a shutter speed that is at least 1/500th of a second. This will ensure that the image is sharp and clear.

Another common mistake is to use a shutter speed that is too fast. This can result in a blurred image, which is often not what the photographer wants. To avoid this, it is important to choose a shutter speed that is slow enough to capture the motion. A good rule of thumb is to use a shutter speed that is at least 1/30th of a second. This will ensure that the image is sharp and clear.



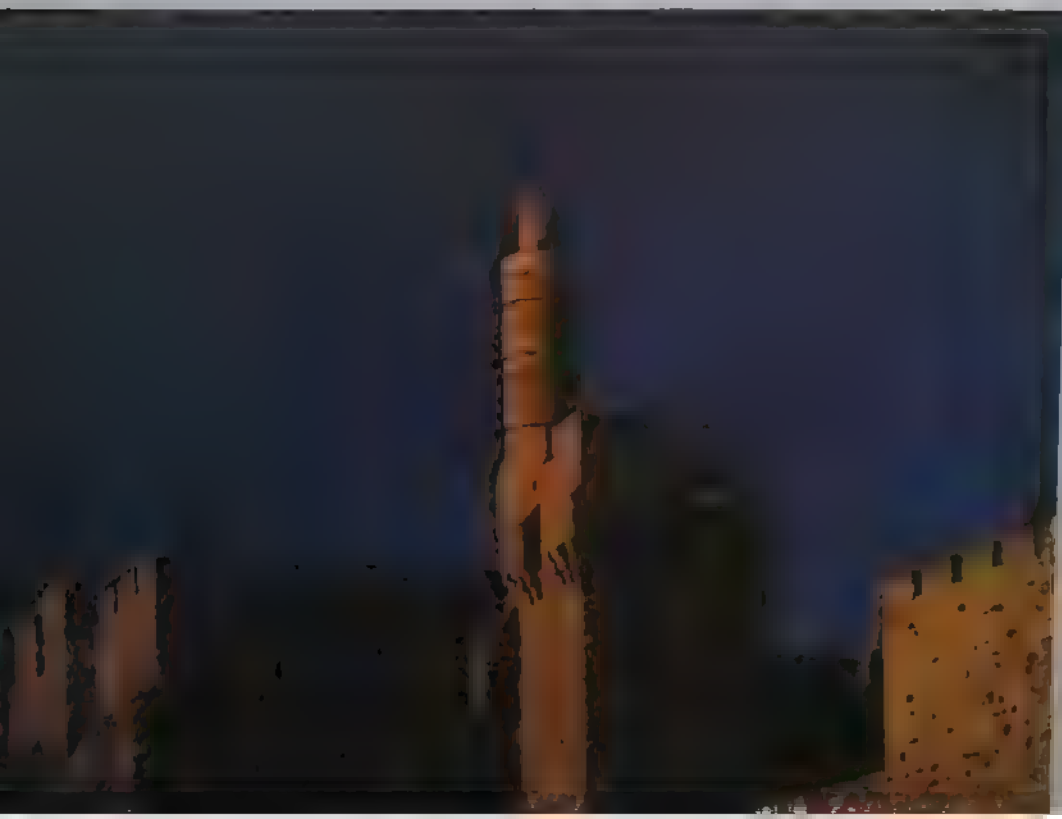
Street scene Sometimes you have to accept overexposure of highlights and loss of highlight detail in order to achieve the best possible shadow detail

A common mistake is to use a shutter speed that is too slow for the subject. This can result in a blurred image, which is often not what the photographer wants. To avoid this, it is important to choose a shutter speed that is fast enough to freeze the action. A good rule of thumb is to use a shutter speed that is at least 1/500th of a second. This will ensure that the image is sharp and clear.

Using the meter

A common mistake is to use a shutter speed that is too slow for the subject. This can result in a blurred image, which is often not what the photographer wants. To avoid this, it is important to choose a shutter speed that is fast enough to freeze the action. A good rule of thumb is to use a shutter speed that is at least 1/500th of a second. This will ensure that the image is sharp and clear.

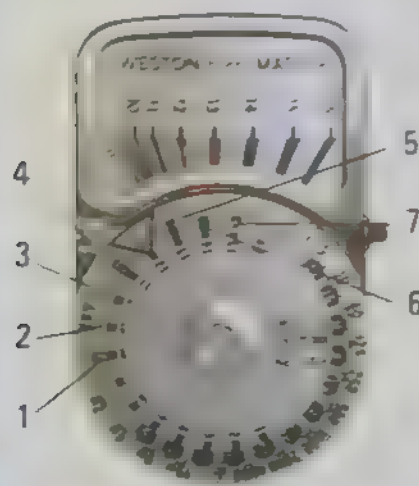
Castle Deliberate underexposure—here by one stop—often helps to ensure good colour saturation and is particularly useful in bright, harsh sunlight



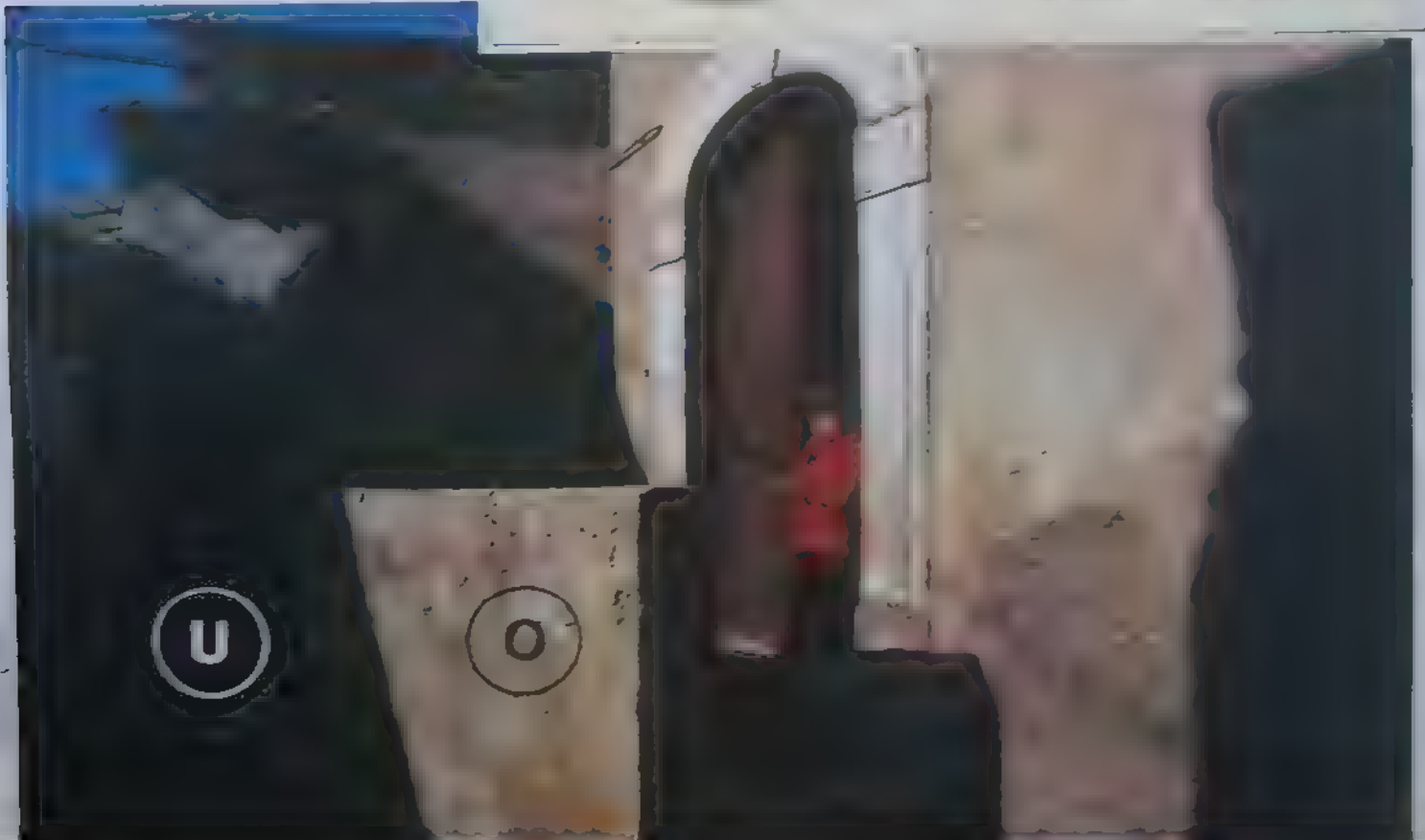
Selective metering

U&O Vary the U setting in the percent area given the best shadow detail while metering from the lightest tones with the C setting concentrated on highlights

Settings on the Weston meter



- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____
- 6 _____
- 7 _____



Custom cameras

If your demands on equipment are very specialized and nothing on the market is quite right—or if you simply want to give your camera the personal touch—'customizing' may be the answer

For the past few years, the camera market has been dominated by a few big names. But now, as the market becomes more competitive, manufacturers are looking for ways to differentiate their products. One way is by offering custom finishes. This is where a camera is painted in a unique color or has a special texture. It's a way to make a camera stand out from the crowd.

Red coat To cater for the growing demand for personalized cameras and bright 'high tech' colours, some manufacturers produce their own custom finishes. This camera and matching tripod is the Konishiroku C35 EF3 in one of their range of fashion colours



Photo: G. L. L. L.

...the camera market has been dominated by a few big names. But now, as the market becomes more competitive, manufacturers are looking for ways to differentiate their products. One way is by offering custom finishes. This is where a camera is painted in a unique color or has a special texture. It's a way to make a camera stand out from the crowd.

...the camera market has been dominated by a few big names. But now, as the market becomes more competitive, manufacturers are looking for ways to differentiate their products. One way is by offering custom finishes. This is where a camera is painted in a unique color or has a special texture. It's a way to make a camera stand out from the crowd.

...the camera market has been dominated by a few big names. But now, as the market becomes more competitive, manufacturers are looking for ways to differentiate their products. One way is by offering custom finishes. This is where a camera is painted in a unique color or has a special texture. It's a way to make a camera stand out from the crowd.

Simple modifications

The simplest way to modify your equipment is to use some of the range of accessories or replacement parts available commercially. This is known as **system customizing**.

System customizing is particularly suitable with high-quality modular cameras, such as the Hasselblad, and many top-of-the-range models of the big systems SLR manufacturers. These cameras can be fitted with a wide range of focusing screens, viewfinders, grips and other optional components. You can make a selection by reading through the manufacturer's catalogue, and then



[illegible][illegible][illegible]

... ..

$$I^{\alpha} u(x) = \int_0^x (x-s)^{\alpha-1} u(s) ds, \quad \alpha > 0, \quad x \in [0, 1],$$
$$\left\{ \begin{aligned} \dot{V}_1 &= -V_1 + V_2 + V_3 \\ \dot{V}_2 &= -V_2 + V_3 \\ \dot{V}_3 &= -V_3 \end{aligned} \right\} \Rightarrow \mathbf{V}(s) = \frac{1}{s^2 - 1} \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$$

1. 111 + 121 = 232
 2. 121 + 131 = 252
 3. 131 + 141 = 272
 4. 141 + 151 = 292
 5. 151 + 161 = 312
 6. 161 + 171 = 332
 7. 171 + 181 = 352
 8. 181 + 191 = 372
 9. 191 + 201 = 392
 10. 201 + 211 = 412
 11. 211 + 221 = 432
 12. 221 + 231 = 452
 13. 231 + 241 = 472
 14. 241 + 251 = 492
 15. 251 + 261 = 512
 16. 261 + 271 = 532
 17. 271 + 281 = 552
 18. 281 + 291 = 572
 19. 291 + 301 = 592
 20. 301 + 311 = 612
 21. 311 + 321 = 632
 22. 321 + 331 = 652
 23. 331 + 341 = 672
 24. 341 + 351 = 692
 25. 351 + 361 = 712
 26. 361 + 371 = 732
 27. 371 + 381 = 752
 28. 381 + 391 = 772
 29. 391 + 401 = 792
 30. 401 + 411 = 812
 31. 411 + 421 = 832
 32. 421 + 431 = 852
 33. 431 + 441 = 872
 34. 441 + 451 = 892
 35. 451 + 461 = 912
 36. 461 + 471 = 932
 37. 471 + 481 = 952
 38. 481 + 491 = 972
 39. 491 + 501 = 992
 40. 501 + 511 = 1012
 41. 511 + 521 = 1032
 42. 521 + 531 = 1052
 43. 531 + 541 = 1072
 44. 541 + 551 = 1092
 45. 551 + 561 = 1112
 46. 561 + 571 = 1132
 47. 571 + 581 = 1152
 48. 581 + 591 = 1172
 49. 591 + 601 = 1192
 50. 601 + 611 = 1212
 51. 611 + 621 = 1232
 52. 621 + 631 = 1252
 53. 631 + 641 = 1272
 54. 641 + 651 = 1292
 55. 651 + 661 = 1312
 56. 661 + 671 = 1332
 57. 671 + 681 = 1352
 58. 681 + 691 = 1372
 59. 691 + 701 = 1392
 60. 701 + 711 = 1412
 61. 711 + 721 = 1432
 62. 721 + 731 = 1452
 63. 731 + 741 = 1472
 64. 741 + 751 = 1492
 65. 751 + 761 = 1512
 66. 761 + 771 = 1532
 67. 771 + 781 = 1552
 68. 781 + 791 = 1572
 69. 791 + 801 = 1592
 70. 801 + 811 = 1612
 71. 811 + 821 = 1632
 72. 821 + 831 = 1652
 73. 831 + 841 = 1672
 74. 841 + 851 = 1692
 75. 851 + 861 = 1712
 76. 861 + 871 = 1732
 77. 871 + 881 = 1752
 78. 881 + 891 = 1772
 79. 891 + 901 = 1792
 80. 901 + 911 = 1812
 81. 911 + 921 = 1832
 82. 921 + 931 = 1852
 83. 931 + 941 = 1872
 84. 941 + 951 = 1892
 85. 951 + 961 = 1912
 86. 961 + 971 = 1932
 87. 971 + 981 = 1952
 88. 981 + 991 = 1972
 89. 991 + 1001 = 1992
 90. 1001 + 1011 = 2012
 91. 1011 + 1021 = 2032
 92. 1021 + 1031 = 2052
 93. 1031 + 1041 = 2072
 94. 1041 + 1051 = 2092
 95. 1051 + 1061 = 2112
 96. 1061 + 1071 = 2132
 97. 1071 + 1081 = 2152
 98. 1081 + 1091 = 2172
 99. 1091 + 1101 = 2192
 100. 1101 + 1111 = 2212
 101. 1111 + 1121 = 2232
 102. 1121 + 1131 = 2252
 103. 1131 + 1141 = 2272
 104. 1141 + 1151 = 2292
 105. 1151 + 1161 = 2312
 106. 1161 + 1171 = 2332
 107. 1171 + 1181 = 2352
 108. 1181 + 1191 = 2372
 109. 1191 + 1201 = 2392
 110. 1201 + 1211 = 2412
 111. 1211 + 1221 = 2432
 112. 1221 + 1231 = 2452
 113. 1231 + 1241 = 2472
 114. 1241 + 1251 = 2492
 115. 1251 + 1261 = 2512
 116. 1261 + 1271 = 2532
 117. 1271 + 1281 = 2552
 118. 1281 + 1291 = 2572
 119. 1291 + 1301 = 2592
 120. 1301 + 1311 = 2612
 121. 1311 + 1321 = 2632
 122. 1321 + 1331 = 2652
 123. 1331 + 1341 = 2672
 124. 1341 + 1351 = 2692
 125. 1351 + 1361 = 2712
 126. 1361 + 1371 = 2732
 127. 1371 + 1381 = 2752
 128. 1381 + 1391 = 2772
 129. 1391 + 1401 = 2792
 130. 1401 + 1411 = 2812
 131. 1411 + 1421 = 2832
 132. 1421 + 1431 = 2852
 133. 1431 + 1441 = 2872
 134. 1441 + 1451 = 2892
 135. 1451 + 1461 = 2912
 136. 1461 + 1471 = 2932
 137. 1471 + 1481 = 2952
 138. 1481 + 1491 = 2972
 139. 1491 + 1501 = 2992
 140. 1501 + 1511 = 3012
 141. 1511 + 1521 = 3032
 142. 1521 + 1531 = 3052
 143. 1531 + 1541 = 3072
 144. 1541 + 1551 = 3092
 145. 1551 + 1561 = 3112
 146. 1561 + 1571 = 3132
 147. 1571 + 1581 = 3152
 148. 1581 + 1591 = 3172
 149. 1591 + 1601 = 3192
 150. 1601 + 1611 = 3212
 151. 1611 + 1621 = 3232
 152. 1621 + 1631 = 3252
 153. 1631 + 1641 = 3272
 154. 1641 + 1651 = 3292
 155. 1651 + 1661 = 3312
 156. 1661 + 1671 = 3332
 157. 1671 + 1681 = 3352
 158. 1681 + 1691 = 3372
 159. 1691 + 1701 = 3392
 160. 1701 + 1711 = 3412
 161. 1711 + 1721 = 3432
 162. 1721 + 1731 = 3452
 163. 1731 + 1741 = 3472
 164. 1741 + 1751 = 3492
 165. 1751 + 1761 = 3512
 166. 1761 + 1771 = 3532
 167. 1771 + 1781 = 3552
 168. 1781 + 1791 = 3572
 169. 1791 + 1801 = 3592
 170. 1801 + 1811 = 3612

M d t c s l e n C r e p e r f

ALL INFORMATION CONTAINED
HEREIN IS UNCLASSIFIED
DATE 05-08-2001 BY 60322 UCBAW

1888 TAFEL 1. 1888 TAFEL 1.

300, 350 g., 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700, 1800, 1900, 2000, 2100, 2200, 2300, 2400, 2500, 2600, 2700, 2800, 2900, 3000, 3100, 3200, 3300, 3400, 3500, 3600, 3700, 3800, 3900, 4000, 4100, 4200, 4300, 4400, 4500, 4600, 4700, 4800, 4900, 5000, 5100, 5200, 5300, 5400, 5500, 5600, 5700, 5800, 5900, 6000, 6100, 6200, 6300, 6400, 6500, 6600, 6700, 6800, 6900, 7000, 7100, 7200, 7300, 7400, 7500, 7600, 7700, 7800, 7900, 8000, 8100, 8200, 8300, 8400, 8500, 8600, 8700, 8800, 8900, 9000, 9100, 9200, 9300, 9400, 9500, 9600, 9700, 9800, 9900, 10000.

6. $\frac{1}{2} \frac{d}{dt} \left(\frac{1}{2} \frac{d^2}{dt^2} \right) = \frac{1}{2} \frac{d^3}{dt^3}$

1. $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

Lens manni

Hasselblad Customizing can often resolve apparently impossible combinations as this Pentacon lens on a Hasselblad body.



Colin Garfield



'Polacheck' A Polaroid customized for exposure checks, with an 80 mm f/2.9 lens and a full range of shutter speeds

Canon F1 Many larger format lenses can be adapted to fit 35 mm cameras, as with this Hasselblad 1000 F 80 mm lens on a Canon body

the mount on the camera body.

The lens-to-body adapter is a worthwhile alternative to customizing because it is usually cheaper and does not require alterations to the camera or the lens. Many adapters are available from stock and there are a few firms that specialize in making one-off adapters. One useful example is a Nikon-to-Pen F adapter which allows the excellent Micro Nikkor to be used for microfocusing on the half-frame Pen F.

However, for many lens/body combinations—particularly with specialist lenses—there is no suitable adapter and the camera must be modified to take the lens. Unfortunately you are likely to lose some or all of the camera's lens linkages, although a skilled repairer will usually be able to retain the automatic diaphragm (albeit expensively). So the best cameras for this approach are usually the simplest. For example, you can modify almost anything for use on a Leitz Visoflex housing because there are no linkages to be disrupted by any customizing work.

For lens changes, the favourite are the relatively simple long focus lenses of 200 mm and upwards. On lenses longer than 500 mm, customizing is almost common, because the lenses available tend to be highly specialized. For the highest contrast—most important in ultra-long lenses—the two-glass Leitz Telyts are best, whereas if you want a 1000 mm mirror lens with an aperture of f/5.6, the Zeiss Mirotar is a likely choice. The Leitz Telyts have preset diaphragms and no metering, and the Mirotar is a fixed aperture lens.

If you want to use a wide range of lenses from a different maker, it may occasionally be worthwhile to have the camera mount customized instead. Many people have Exas and Exaktas converted to the M42 mount, but this removes the possibility of diaphragm

adaptation. The pen adapter had an old Canon Perix converted to a Nikon mount, so it would join with the rest of the Nikon system whilst retaining the suitably dubious advantages of the fixed pentaprism mirror—this was a thin half-silvered mirror that stayed in place when the picture was taken, a feature later incorporated in the Nikon F2H.

The ease of conversion depends on the original flange distance of the camera. The 43.5 mm of the Nikon for example, means that there is very little scope for modifying the camera body (and it is hard to see why anyone would wish to). But the lenses can be adapted to fit many cameras. Conversely the slim-bodied Alpa and Olympus Pen F reflexes can be used with almost any lens—there is so much room to spare that an adapter is all that is needed.

Specialist customizers

If no modification of an existing camera will give you quite the facilities you want, you may be able to have a camera built up for you from specified parts. A good example of a custom-made camera using

many existing parts is the 'Leica' Super V made by the Leica Workshop in England. It is a 35 mm SLR with a 50 mm f/1.8 lens, a 1/1000 shutter and a 1/500 shutter, and a 1/1000 shutter. It is a 35 mm SLR with a 50 mm f/1.8 lens, a 1/1000 shutter and a 1/500 shutter, and a 1/1000 shutter.

An alternative approach is to build a camera from scratch, using a 35 mm SLR body with a 1/1000 shutter and a 1/500 shutter, and a 1/1000 shutter. It is a 35 mm SLR with a 50 mm f/1.8 lens, a 1/1000 shutter and a 1/500 shutter, and a 1/1000 shutter.

In New York, Marty Fischer, famed for his custom-made cameras, has built the use of these photographic plates to give 35 mm users the possibility of using 4x5 35 mm Polaroids. In the absence of interchangeable backs for most cameras, this may well be a difficult modification, but be useful.

Leica Reputedly built for a Maharajah, this gold plated, lizard skin covered Leica Luxus was followed by a further 95 'custom' built variations



Courtesy of the Paul Henry van Hasbroek

Putting your pictures to work

Photography can be an expensive hobby, even if you do your own processing, so why not try putting your photographs to work and make them pay for themselves?



Brian H.

making and processing them, many amateur photographers leave their photos lying in a drawer. This seems a little waste, when there are many ways in which you can make your photos work for you—from adding a personal touch to household items, making Christmas cards and novelty items, to selling them.

Greetings cards

Greetings cards are naturally a popular way of using photographs. The simplest way to make them is, perhaps, to produce prints in the darkroom and stick them to a stout card. For small numbers of cards, this is cheap, and the pictures can naturally be of high quality. But it is difficult to make the photos stick neatly; they tend to lift up at the edges. The natural curl of the photo can make the card curl as well. Another disadvantage is that the inside of the card is not

printed, unless you stick your photo over an existing card's design—though at Christmas photographic firms do often provide cards with slits to hold standard postcard-sized prints.

If you do stick photos on cards, use a rubber-based adhesive sold in tubes or cans. The tubes are better than the cans since they do not dry out so easily, though they are not so widely available. Aerosol mounting spray is now considered something of a health hazard and is banned by many professional layout studios.

Spread adhesive on both surfaces, overlapping the area of card to be covered. When it is fairly dry, press the photo on to the card. Then, with an eraser made of dried adhesive, remove the excess from around the photo.

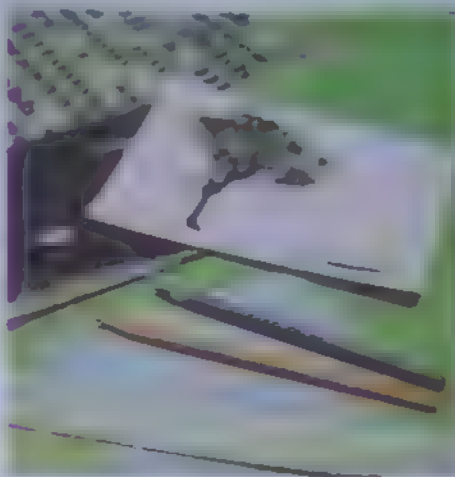
For a more professional look, you can use dry mounting techniques (see pages 740 to 743). It is particularly worth dry

Christmas card made by silkscreening a lith version of an original photo and adding lettering

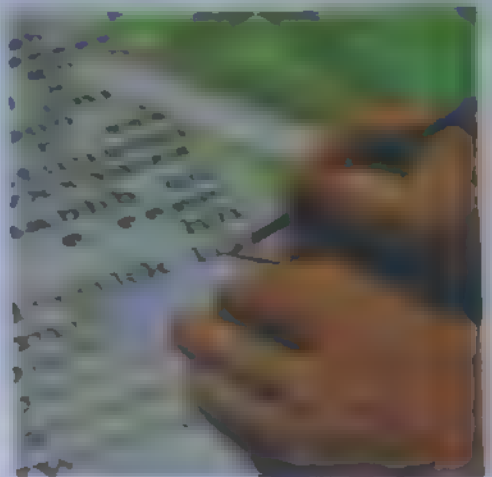
mounting if you want to print pictures or lettering on the inside of the card as well, because, when dry mounting, you often have to mount a print on the inside anyway to counteract the curl of the cover print.

Separate prints for outside and inside can make the card rather bulky—especially when you consider the thickness of the card necessary to overcome the two prints' natural curl. The card can also be printed on both sides photographically if you coat it with liquid emulsion (see pages 1306 to 1309) but this does not generally provide adequate blacks. So the best alternative is to have the card printed by litho or instant print, using camera ready copy which you prepare in your darkroom.

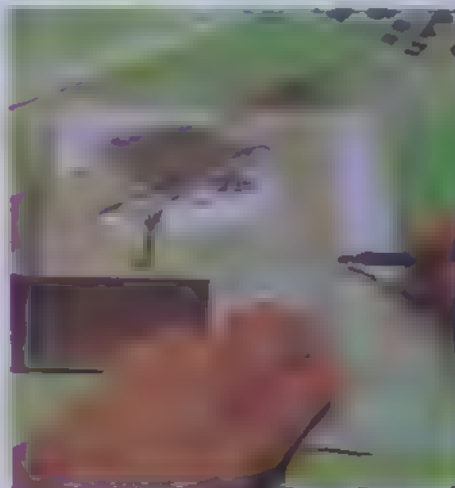
Making a greetings card



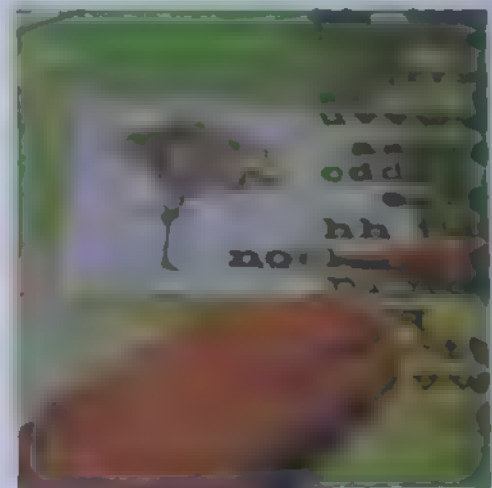
1 For a limited number of cards, you can use ordinary glass and a type of screen printing method. First choose and prepare the image components.



2 Or, if you are making a large number, you have to use a special screen printing method. First choose and prepare the image components.



3 If you are copying on ortho film, you can mark the original sheet with a blue pencil (which will not show up on ortho), to show positions for the lettering.



4 Lay a sheet of suitable acetate, such as Kodatrace, over the print and carefully burnish each letter into position. Rub gently to avoid scratching the letters.



5 When each letter is in position, very carefully peel back the transfer sheet. If a letter breaks, let the sheet fall back into position and then burnish again.

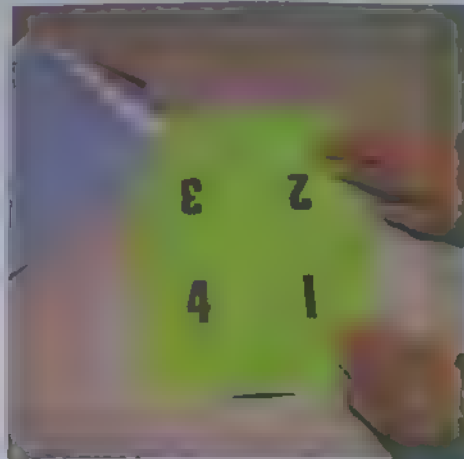


6 You can now copy the original print by lettering over a suitable background with your chosen lettering standard copying techniques.

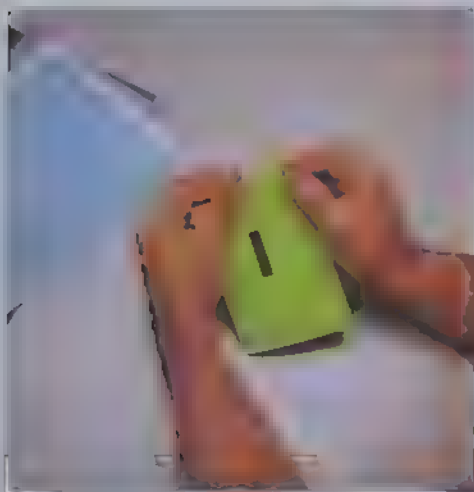
can try to take a photo of a snow scene, for example, or a picture of a

unsuited to handling large areas of black or halftones, so restrict the image to lines and areas of black in the range of about 0.3 mm to 10 mm if possible. But remember that you can ask for the image to be printed in any coloured ink instead of black, on coloured paper. You should also discuss your requirements with the print shop first—they may have a restricted range of card thickness and

7 An alternative is to add the dry transfer lettering to one of the lith image components. Here it is shown on the film used to print black in the card



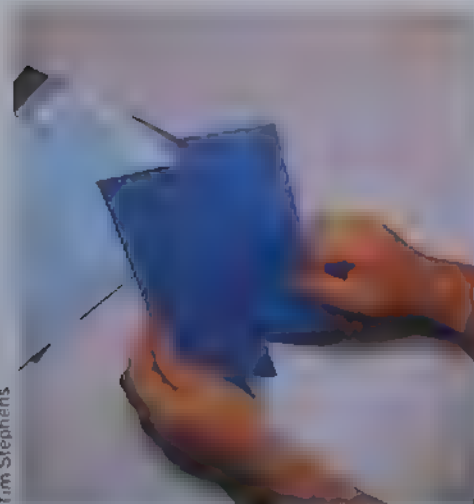
8 To print 'both sides', you can print all the images on a large sheet and then fold. But you must work out the folding first to establish how to print the images



9 Folding can be done easily enough by hand, using the flat of a finger- or thumb-nail to form the creases. For a neater edge on thick card, score along the fold first



10 Folding 'dry runs' and dummies can help you correctly locate and properly orientate printing or lettering on all outer facing surfaces (shown here in figures)



11 Try various folding techniques to ring the changes—this 'concertina' form looks good and stands up much better than conventional foldings



12 Other changes can be made simply by changing the size, area, colour and format of the paper or card used for mounting or printing your greetings cards

[illegible][illegible]

...in spots
such as platinum print
print should be lo
and you
prints you ma
lay They shou
I d d
the
I d I

[illegible][illegible]

There are probably many more potential markets. Many people will be happy to buy an A4-size print in black and white—of some attractive local scene, for example, or of holiday films as long as it was well made. This would allow both you and a retailer a reasonable profit margin.

Choose scenes that offer real photographic potential—use your photographer's eye. If you hope to attract people with your shots, it is worth taking trouble over them. Even if your area is not particularly full of attractive old buildings, you can still use your skill to create good pictures with strong local interest. Discuss with friends what they think people would like—do your own market research.

when fixing and washing. Customers will not be happy with prints that turn yellow.



after six months. In tourist areas put yourself in the place of a tourist and look at postcards. There is no point in duplicating those shots, particularly as they tend to be unimaginative. You can produce your own postcards from prints, though for the printing on the back — details of the pictures, the line down the middle and the address rules which prevent the postman from mistaking the card for a letter — you will need to use a special mat of aluminium (see pages 10 to 11) and photo-etching (see page 2125). Look at examples of postcards and to improve your own. Examples of interesting Other interesting possibilities are offered by the etch blea (see pages 2125 to 2125) and Color Key (see pages 2125 to 2132) for making graphic prints quickly and cheaply.

emulsion
special mat
aluminium (see pages 10 to 11)
photo-etching (see page 2125)
look at examples of postcards and to improve your own. Examples of interesting Other interesting possibilities are offered by the etch blea (see pages 2125 to 2125) and Color Key (see pages 2125 to 2132) for making graphic prints quickly and cheaply.

Working as a photographer

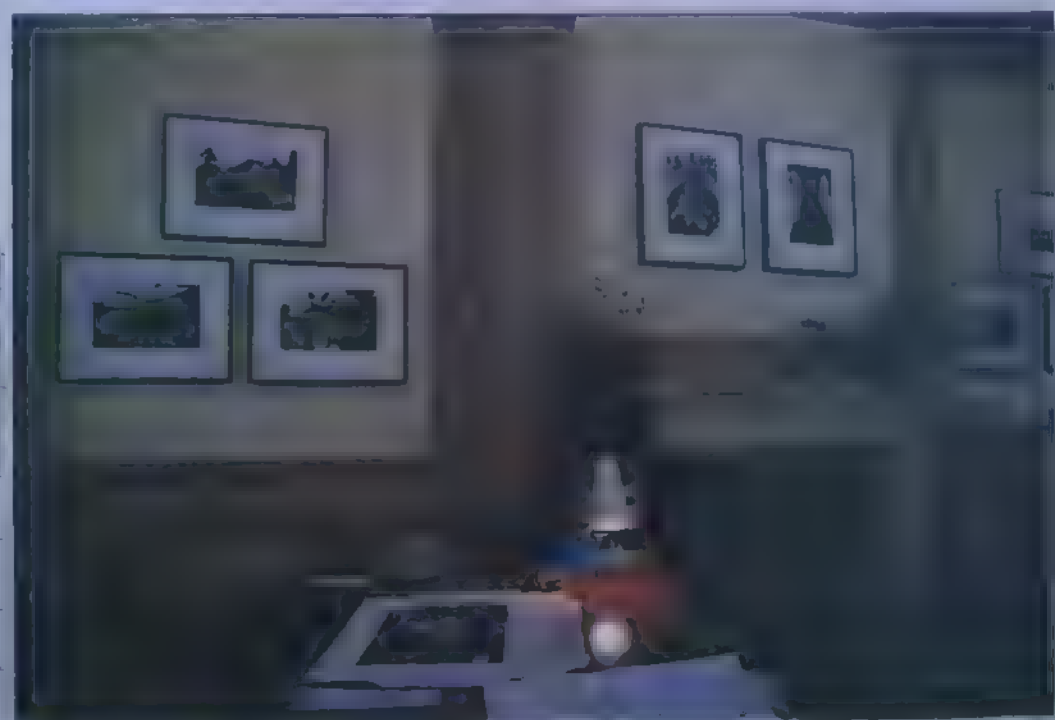
Some amateurs set themselves up as a time portrait or wedding photographer but this is entering into competition with local commercial photographers who might regard you as unfair competition, especially if you undercut them. After all you have overheads and only want pin money.

There is nothing to stop you doing this, of course, but it is somewhat unethical. What you can do, however, is work

Photos at work Just some of the many ways in which you can make your photos work for you. Personalized greeting cards are always popular; mounted prints of the family are good presents for distant relatives; photo key fobs and bookends make nice individual gifts, and etch prints of your own photos can add a touch of class to your walls. If your pictures are of a consistently high standard, you may be able to display them in a local gallery or sell off prints in limited editions through a suitable outlet such as an art shop.

Let others benefit from your efforts. You can make a profit. Your decision is whether you are willing to make the effort to do it.

But photography remains able to offer a permanence. After all as a word is even more vulnerable to erasure than a photograph, the photograph is a word. Your photographs are your words.



DENIS WAUGH

Discovering a secondhand Gandolfini was the turning point in a career which would eventually bring Denis Waugh's distinctive style to top magazines in the UK and USA

It's not often that a photograph is so instantly recognisable as Denis Waugh's. The soft, finely detailed image are totally unmistakable, whether the subject is a veteran car or dawn over a landscape.

Waugh's style is a blend of the soft, finely detailed image and the sharp, high-contrast image. He has a unique ability to capture the essence of a subject in a single frame.

New Zealand's Waugh is a professional photographer who has worked for many years. He has a unique ability to capture the essence of a subject in a single frame. His work is characterized by its soft, finely detailed image and its sharp, high-contrast image.

After working as a professional photographer in New Zealand, Waugh moved to London in 1975. He has since worked for many years as a professional photographer in London.

Waugh's style is a blend of the soft, finely detailed image and the sharp, high-contrast image. He has a unique ability to capture the essence of a subject in a single frame. His work is characterized by its soft, finely detailed image and its sharp, high-contrast image.

Waugh's style is a blend of the soft, finely detailed image and the sharp, high-contrast image. He has a unique ability to capture the essence of a subject in a single frame. His work is characterized by its soft, finely detailed image and its sharp, high-contrast image.

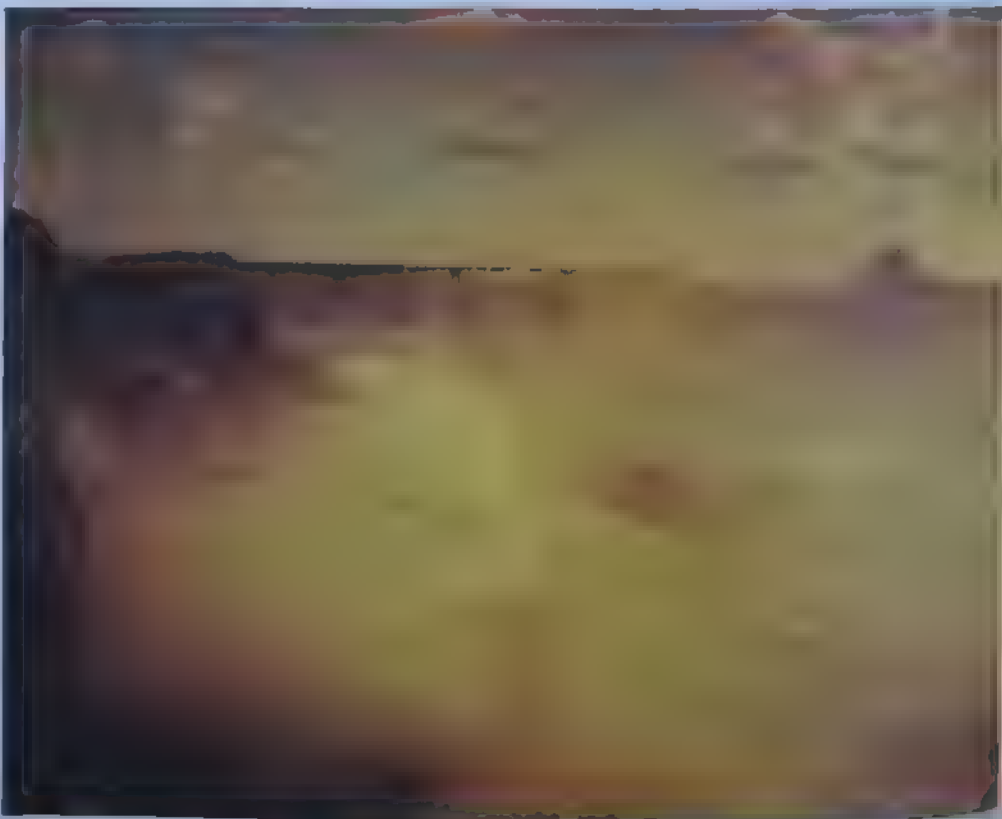
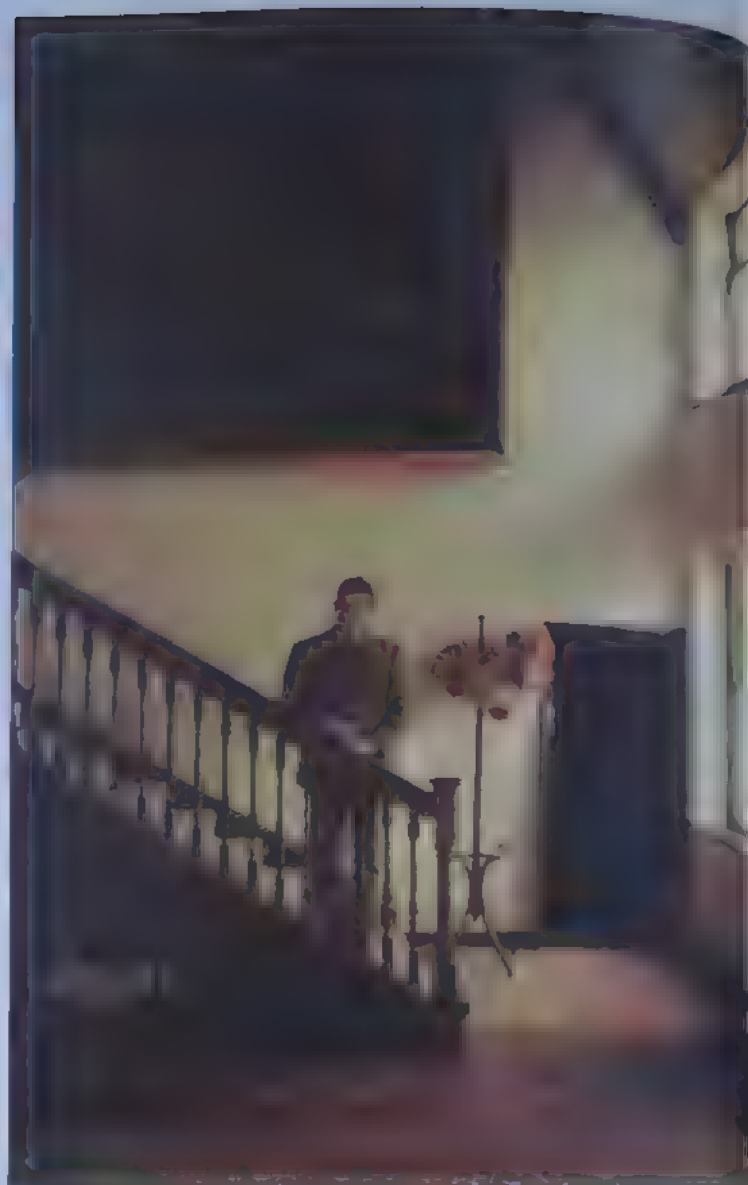
Waugh's style is a blend of the soft, finely detailed image and the sharp, high-contrast image. He has a unique ability to capture the essence of a subject in a single frame. His work is characterized by its soft, finely detailed image and its sharp, high-contrast image.

Waugh's style is a blend of the soft, finely detailed image and the sharp, high-contrast image. He has a unique ability to capture the essence of a subject in a single frame. His work is characterized by its soft, finely detailed image and its sharp, high-contrast image. Above all, it gave him a few years' confidence in his photography, the most practical and useful direction I've ever had in my life.

Besides giving him the chance to experiment with new equipment and facilities, the course also gave Waugh access to a wide range of professional

Portrait This portrait of Thomas Eyston, with its immaculate lighting and composition, typifies Waugh's approach. He mixed daylight and flash, exposing for five seconds

Clevedon pier Waugh took this shot as part of a series on 'Piers in peril' for the Sunday Times. He used a 1/2 second exposure to soften the wave and warmed the tones with red and 81a filters







Toledo *This pastel-toned photograph of the hill town in Spain was shot for a story about El Greco, the Spanish artist, on commission from the American magazine 'Life'*



Opari & Waudh

Royal Portrait This portrait of Queen Sofia and Crown Prince Felipe of Spain is from a series on 'The Royal Heirs of Europe', published by 'Life' in August 1982

[illegible][illegible]

Another important technique Winters uses in his photography is his use of long exposures. He cannot remember using a shutter speed faster than a 1/15 and is more likely to expose his subjects for anything from 30 seconds up to several minutes. Even his portraits are taken on exposures of five to ten seconds. If he is using flash this will serve

$$K_{\text{eff}} = \frac{\sum_i K_i x_i}{\sum_i x_i} = \frac{0.8(0.6) + 0.9(0.4)}{0.6 + 0.4} = 0.84$$

... and he quickly flips the
... hands up with a series
... an almost identical d...
... that he can push the
... series of shots after the first
... At this stage he can push the
... series of shots to exactly the
... density each requires

For Waugh, the way in which he photographs gives him far greater control over the way his work is seen. His photographs are rarely cropped and although his clients are usually presented with a small choice of final transparencies each will be superb.

It is this dedication to perfecting his highly individual approach to a subject that has earned Waugh such a considerable reputation. His pictures, with their

Understanding...

Stereo images-2

The two pictures needed for a stereo pair can be taken on an ordinary camera, shifted sideways between exposures, but real stereo enthusiasts prefer to use special binocular cameras and stereo attachments

When Henry Collen, under the guidance of Sir Charles Wheatstone, took the first stereo photographs in the early 1840s, he did not have a special camera. He used an ordinary plate camera of the time and made a stereo pair simply by making an exposure, moving the camera sideways a specified distance and making a second exposure. There is nothing wrong with this sequential exposure technique. Indeed, it is still a popular way of taking stereo pictures today, popular because no special equipment is needed (see page 1470). But the scope and quality of stereo photography is considerably increased by special cameras and attachments that allow simultaneous exposures.

Sequential exposures have two big drawbacks for stereo work. First, they cannot be used for moving subjects—even the tiniest movement of the subject between shots destroys the stereo effect. Second, they are time consuming and call for painstaking care to ensure that the camera is moved correctly.

It would be possible to make simultaneous exposures simply by placing two cameras side by side and firing them together. But this is unsatisfactory for a number of reasons. Essentially, the problem lies in achieving two images that are identical in all but viewpoint. Minor differences—differences that might not normally be perceptible—can show up glaringly when the images of the pair are viewed together, the stereo effect is weakened at least.

With two cameras, for instance, the exposures can be slightly different—because either the speed of

the film in each camera or the shutter speeds vary slightly from the nominal rating. Similarly, the focal lengths of the lenses on each camera may be very slightly different, so that the two images can never be perfectly superimposed. Even two lenses of the same specified focal lengths from the same manufacturer can be sufficiently different to be unsatisfactory.

Over the years, the solutions to these problems have taken two principle forms: *binocular cameras* and *stereographic beamsplitters*. Binocular cameras are cameras designed specifically for stereo photographs. Beamsplitters are attachments that fit on to the front of a conventional mono camera to allow it to make

Stereo plate cameras, a wet plate sliding box (top) to the Richard Vernon of 1894 (bottom right).



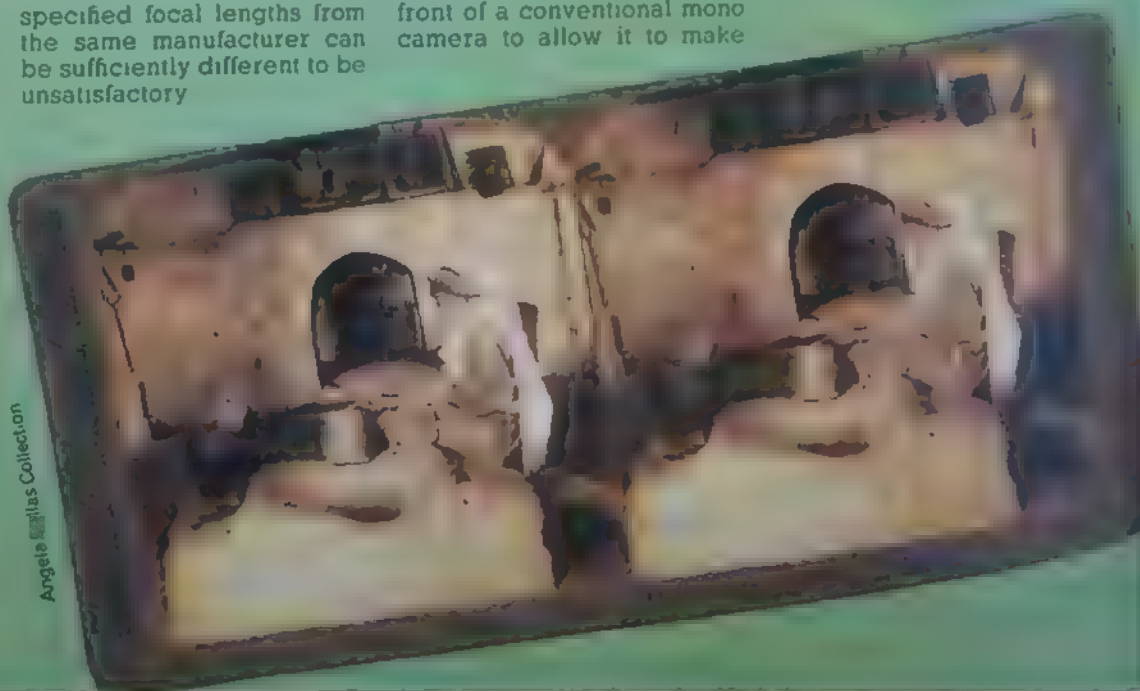
Courtesy of the Kodak Museum

important

Binocular cameras

The idea behind a binocular camera is a single body with two lenses, one for each eye—hence the name. The exposures can be made on the same piece of film so that there are no problems with variations in film rating and processing. The lenses can be perfectly matched during manufacture. And the body can be constructed to ensure perfect alignment and consistent separation.

The first commercial binocular camera is credited to A. Quinot of Paris, who put his camera on the market in 1853. Over the next 30 years many binocular cameras were produced, but they were almost all as conventional as the first. Stereo photography was, you like, the television of the Victorians, and many

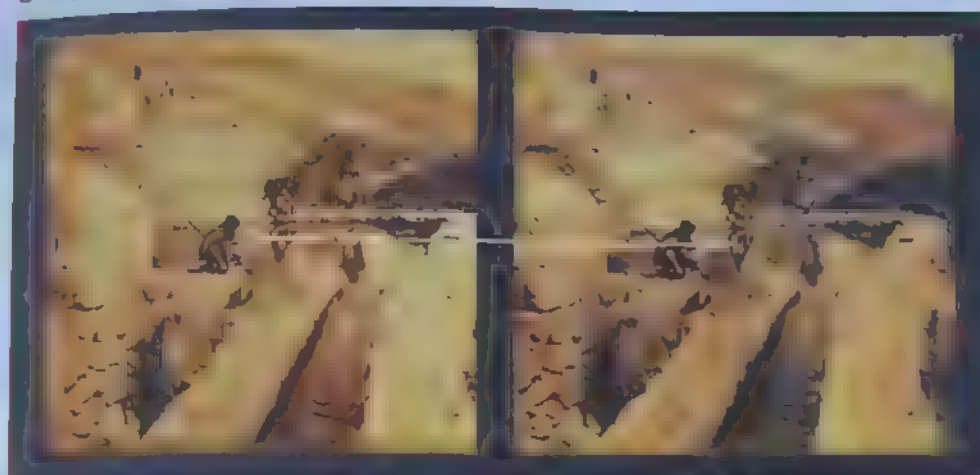


Angelo Atlas Collection

Stereograph This scene from the Holy Land is typical of many of the shots taken on stereo cameras in the 1800s

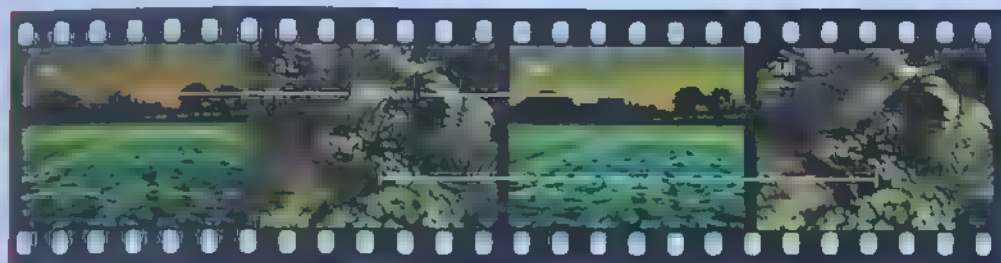
Recording stereo pairs on film

6 × 6 cm binocular camera



Artwork by Chris Lyon

35 mm binocular camera



35 mm beamsplitter



With the 6 × 6 cm format, the two images of a stereo pair are recorded side by side, with the centres separated by 65 mm. To achieve the same separation on 35 mm, frames have to be interlaced. With a beamsplitter, the attachment provides the separation and the pair are recorded in a single frame.

interpret photographers set out with their binocular cameras to bring back 3D memories of the past.

Many of these early binocular cameras were made of a box-shaped plate with two lenses set at a distance behind the front plate. In the 1860s there were some 12 mm designs. A number of stereo cameras for sale then looked like binoculars. In one, the photographer could appear to be looking through the binoculars in one direction while actually sneaking his eye to the picture with the other eye pointing hidden in a side attachment.

Interest in stereo photography declined towards the end of the 19th century, but a few photos in books and magazines created a more lasting form of interest. It was not until the 1920s that the world

looked. Binocular cameras continued to be produced, but they were much more novelty items than they had been. Despite brief bursts of popularity in the 20s and 30s, stereo cameras never sold in quantity again.

Interestingly, manufacturers tended to choose the 35 mm format for binocular cameras from the mid 20s onwards despite the fact that the 6 × 6 cm format is inherently more suitable. This is partly because of the novelty appeal of stereo cameras, but also because it is much easier to make fast matched lenses for 35 mm. With large format stereo cameras, maximum apertures are rarely wider than f/6.3. On the famous 35 mm Iloca Stereo Rapid of the 50s, however, you could get a Cassart lens with a maximum aperture of f/2.8.

With the 6 × 6 format it is relatively easy to work out the arrangement of stereo pairs on the film. Since, with a 5 mm gap between frames, the centres of two 6 × 6 cm frames placed side by side are exactly the required base distance (65 mm) apart (see page 2455) the film can be wound, two frames at a time, sideways behind the lenses just as in a conventional camera.

On 35 mm, however, recording the images on the same film from two lenses 65 mm apart is slightly harder. There are two principle solutions. The system popular in France gives negatives 24 × 30 mm. If the centres of a stereo pair of negatives like this are 65 mm apart, there is a gap of 35 mm between them. For the next exposure, the film is wound on one frame so that the right

image is recorded on the next frame. With the 35 mm system, giving 24 × 30 mm negatives, the film is advanced simply two frames at a time. It is this feature that makes the transport mechanism, but the negatives are undesirably small.

With the 35 mm system, the film is advanced simply two frames at a time. It is this feature that makes the transport mechanism, but the negatives are undesirably small.

Beamsplitters

Rather than make a completely new camera for stereo work, some manufacturers right from the 1860s preferred to fit mirror or prism attachments to the front of a conventional camera. These are in a way like refracting stereoscopes in reverse. At the front they have two light intakes, the same distance apart as the lenses on a binocular camera. The light from each of these intakes is deflected towards the camera lens by mirrors or prisms. The lens thus receives two different images. As these two images pass through the lens they cross over normally so that they are recorded upside down and back to front. When mounted and inverted they can be viewed easily in a normal stereo viewer.

The disadvantage is that both halves of the stereo pair are recorded in a single frame. With 35 mm this means that each image is only 18 × 24 mm—indeed slightly less because there is always some overlap. Quality is therefore limited. Each half of the pair also receives only half the light that a full 35 mm frame would—and possibly less since some light is inevitably lost in the beamsplitter—so exposures are long.

Nevertheless the method is simple to use and very cheap. It is significant that the only piece of stereo equipment marketed by the big Japanese manufacturer is Pentax's beamsplitter attachment.

Combining images

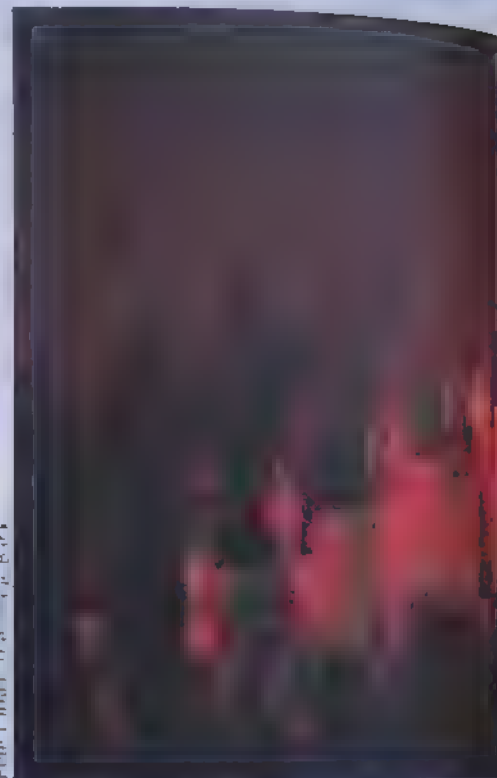
By combining two or more slides or negatives in a single picture, you can transform the dulllest scene or create entirely new and fantastic images of your own

THESE DAYS, IT'S EASY TO FIND a picture that's just what you need. But if you're looking for something that's truly unique, you'll have to create it yourself. One way to do this is by combining two or more slides or negatives in a single picture. This technique can be used to create entirely new and fantastic images of your own.

Since I have been using this technique, I have found it to be a very effective way to create new and interesting images. It's a technique that can be used by anyone, and it's a technique that can be used to create images that are truly unique.

There are many ways to combine images, and I have found that the most effective way is to use a combination of slides and negatives.

The process is simple. First, you take a picture of the scene you want to combine. Then, you take a second picture of the same scene, but with a different background. Finally, you combine the two pictures using a combination of slides and negatives. The result is a new and interesting image that is truly unique.



Page Turner The image book

Images to be used as a backdrop for a dramatic sky. It's a good idea to use a telephoto lens for this.

Combining images is a technique that can be used by anyone. It's a technique that can be used to create images that are truly unique. The process is simple. First, you take a picture of the scene you want to combine. Then, you take a second picture of the same scene, but with a different background. Finally, you combine the two pictures using a combination of slides and negatives. The result is a new and interesting image that is truly unique.

Cityscapes and landscapes

Famous landmarks, such as buildings and city skylines, are excellent material for incorporating symbolism or surrealism that is the product of combined images. Some have all been photographed before it is

Claw head With a little practice and subtle-hand colouring, you can combine the most unlikely negatives—here eight—to create bizarre yet convincing images

Cellist An elaborate dream sequence, with a combination of reality, as the scene is photographed.

Any object that has a strong, simple shape such as a bridge, a tree or a train can make an association with another subject. Similarly, people photographing backlit windows or doorways can use them to create a more innervating image—a huge eye staring at you through a window makes you feel like you are inside a doll's case. The doorway that opens on to a wide-angle shot of a deserted beach

One of the most popular and interesting subjects to be used in combined images is people—perhaps because there is so much scope for using combinations to explore personality.

multiple exposures especially if you wish to add a giant moon or sun to a cityscape or landscape. It's important to decide first on the kind of effect you want to achieve and adapt the composition and lighting accordingly. If you are doing a shot of the moon combined with an unrelated subject such as a figure or a portrait, try to make the subject look as if it is illuminated by the moon. A blue filter will create the illusion of moonlight. Wide angle images where there is foreground interest such as pebbles on the beach or waves crashing on to rocks shot with an overhead sun or moon will very effectively give the illusion of combining great distances or could give an impression of surrealism. You can apply much the same rules to including a moon with landscapes and seascapes. Watch out for an interesting horizon

Alan Chosnet/The Image Bank





Creative approach

Slab Combining images allows you to defy all the laws of nature and so pose insoluble puzzles—how does it stay up?

sandwiched with texture screens or slides having strong patterns or colours. Use masks to put a bed of flowers or create a ghostly image by double exposure.

exposures of a face in different positions to give an all round view of somebody or for a more sinister effect.

person's face with that skull, shot from the same position. You can make your friends through your eyes. Superimpose them on their homes, or export them to other assentment of heads and legs together. Make your eyes superimposable on each other, so that it appears like a face.

(S. L. R.)

Make play to create material for creative inquiry and to have they containing them with a purpose to create the illus. in their new world by sandwiching a new and old world together. Make use of parts of the body such as hands, feet, legs to repeat patterns or use them as a silhouette to frame another image by making use of light and shadow to create distinct color. Play with form, include a three dimensional shape such as a bottle, a soap paper and other photograph the two together to convey a new meaning or make an abstract piece in any medium.

[illegible]

Movement

Combining images is an extremely effective way of capturing movement or creating the illusion of movement. One image can show a variety of static positions of something that is moving. This works very well in natural situations, such as the wind blowing through the trees. In the top image, one or four exposures in exactly the same position at a fast shutter speed, the main



Levy N. Johnson

HENRY W. D. IN THE SAME PLACE
 AND IN THE COURT OF THE DISTRICT OF
 COLUMBIA, IN THE MATTER OF THE
 ESTATE OF HENRY W. D. DECEASED
 BY WILL.

the same frame several times by releasing the multiple exposure or film rewind button. Calculate your exposure for the number of exposures you want

A strobe flash is ideal for capturing a chain of images in a continuous action. The camera can be set on B, provided that the room is completely blacked out

House Sandwiching the misty photograph of the house with the birds has upset the colours and given an eerie quality



Atain Choisnet/The Image Bank



Girl and daisies A popular way of lifting a portrait is to combine it with an associated or appropriate image

Shooting images for later use

When you shoot a slide, you are creating a permanent record of the image. This is why it is important to shoot a slide of the original image before you start to create your composite. This way, you can always refer back to the original image if you need to. The original image should be a clear, well-lit photograph of the subject you are interested in. This will make it easier to see the details of the image and to create a composite that looks natural.



Abstract The subject of the original slide need not be important—it can provide the building blocks for an entirely self-created image

Ship A powerful silhouette and a close up of reflections on the water exposed on the same frame for a mysterious image

When you shoot a slide, you are creating a permanent record of the image. This is why it is important to shoot a slide of the original image before you start to create your composite. This way, you can always refer back to the original image if you need to. The original image should be a clear, well-lit photograph of the subject you are interested in. This will make it easier to see the details of the image and to create a composite that looks natural.

Country scenes

Landscape photography may seem a leisurely pastime. To James Ravilious, however, it is a very active way of life, as he shows in this assignment using both b & w and colour film deep in the heart of the English countryside



James Ravilious was a British landscape painter and photographer. He was born in 1899 and died in 1952. He was a member of the Bloomsbury Group and was known for his detailed and atmospheric landscape paintings. He also took many photographs of the English countryside, which he used as inspiration for his art. His work is characterized by its focus on the natural world and its ability to capture the beauty of the landscape in a way that is both realistic and idealized. His photographs are often characterized by their soft focus and their use of light and shadow to create a sense of depth and atmosphere. His work has been widely exhibited and is highly regarded by art and photography enthusiasts alike.



...ry 1 p and
to time its the life and landscape of the
As he goes around he talks to
...meets. They usually agree to
... and told him when
... the grain is happen
... two Leica bodies
... IPS black and white and
... film. He uses only
... with a 90

using a separate view
field of view, and using the built-in
rangefinder he can work very quickly
with Leicas.

Until recently most of his work was in
black and white only but now he uses

He reserves the colour for

... the

people ...

colour in a land ...

blue and green ...

or a ...

many others ...

from ...

light ...

...

...

A.F. ...

...ment by g ...

...minutes developm ...

This all will ...

... A.F. ...

his shots, without ...

dodging. 'I don't like ...

says 'You can ...

enlarger burning in the ...

Cow and gate James **Ravilious often uses** **animals as** **foreground features**

On this day the
morning light was
ideally suited to
Kodachrome, which
brought out the
subtle colours. The
warm colouring of
the cow

complements the
landscape hues and
aids the composition
in what would
otherwise be a
muddy scene

Mrs Piper The wife
of a local farmer with
the flowers which
she enters in local
shows. This picture
would lose a great
deal in b & w

Stocks The lower
shot shows how a
landscape can look
very effective in
black and white.

especially when it is
rich in detail, tone
and texture. James
felt that colour was
not necessary until a
rainbow appeared,
making the colour
shot much more
worthwhile





River view James Ravilious uses the zone system to decide on the exposure—particularly useful where there is a wide tonal range

Shady lane This scene was virtually monochromatic in color, but in b & w, however, the tones predominate



What went wrong?

Street musicians

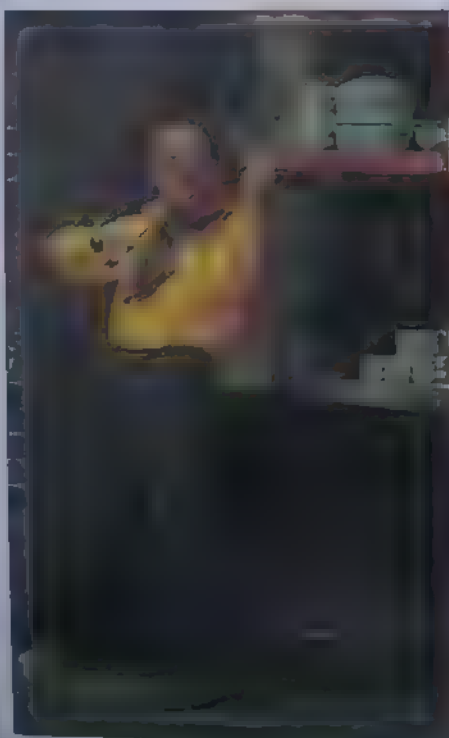
By dropping a coin in a guitar case you can generally make a willing subject of a street musician. The time thus gained for composition, as Ian McKinnell finds with these examples, can be well-used or wasted



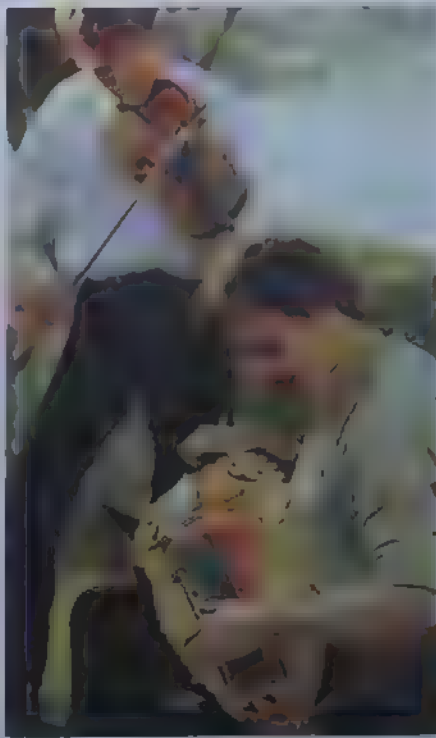
Photographing people on the street can be very difficult for few people have the audacity to be able to confront perfect strangers and snatch their image. To succeed despite shyness either use surreptitious means such as using long lenses or simply shoot people who don't mind having their picture taken. Street musicians will normally fall into this category provided you leave them a little money! But even willing subjects can be made into bad pictures. The musicians here look bored and disinterested and the composition is certainly uninspired with a clumsy and messy background. The decapitated spectators are particularly noticeable—especially as the drummer is staring out of the shot to where their faces should be. There are many ways this shot could have been improved: waiting for a more interesting part of the act for example or concentrating on the small child, or perhaps including just the organist.



This picture shows a good idea badly let down by its execution. If you look closely you can see that the image is not sharp so this would appear to be a grab shot taken quickly to try and catch the proper unawares. Looking around the edges one can see that this was not totally successful—it rarely is. But there seems no reason to have hurried this shot: the musician would not have scuttled off at the sight of a camera and the passers-by are not in positions that seem worth capturing. The photographer should simply have taken more time and care: waiting until the accordionist was in a more interesting posture and the passers-by made a more interesting group. Then the photographer could have made sure that the focus was correct, seen ugly details such as the black triangles above the musicians' head and avoided them and, above all, made this the vertical composition that the image shouts for and made a picture worthy of the idea.



In contrast to the picture above in this shot the photographer has caught the attitude of the musician perfectly. His face is a fascinating example of studied concentration and he has exactly the style and poise that one would expect of a major violin soloist in mid concert. Yet he is far from being in evening dress and his audience seems to consist mainly of rows of unanimate crockery. It is the gentle absurdity that makes this a successful shot—it contains wit instead of mere humour. The composition is a little weak, but the image is so strong that it still shines through.



This shot shows a careful use of selective focus and has a classical composition and colouring that is entirely in keeping with the subject matter, giving the shot a serene, timeless feel, despite the concrete in the background. The way that the two figures fit together helps to put forward the idea of two individuals playing in harmony. However, the shot might have been improved by using a lower viewpoint to bring the hurdy-gurdy player and the violinist closer together and avoid the distracting shape of the violinists' legs. Always compose carefully.





MOVIE EFFECTS

Special movie effects have come a long way since the days of Buster Keaton and a modern effects department uses an array of sophisticated techniques, often computerized, to create ever more fantastic illusions for the movie goer

Special effects are as old as the movie itself. In fact, many of the earliest films used trick photography almost exclusively to make their impression on the viewing public. Most of the early special effects techniques developed then are still in use today. And recently they have been augmented by a new generation of complex technical effects especially devised to meet the demands of the blockbuster science fiction productions and commercials. These special effects techniques may be applied at any one of the numerous stages of film-making—ranging from changing the film speed or using miniature models while filming to the use of optical effects at the printing stage or computer graphics

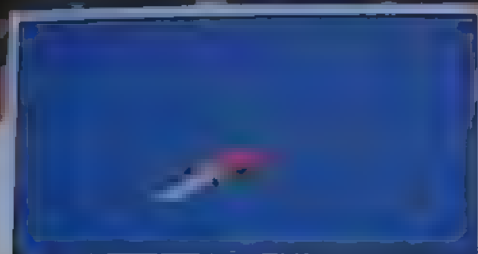
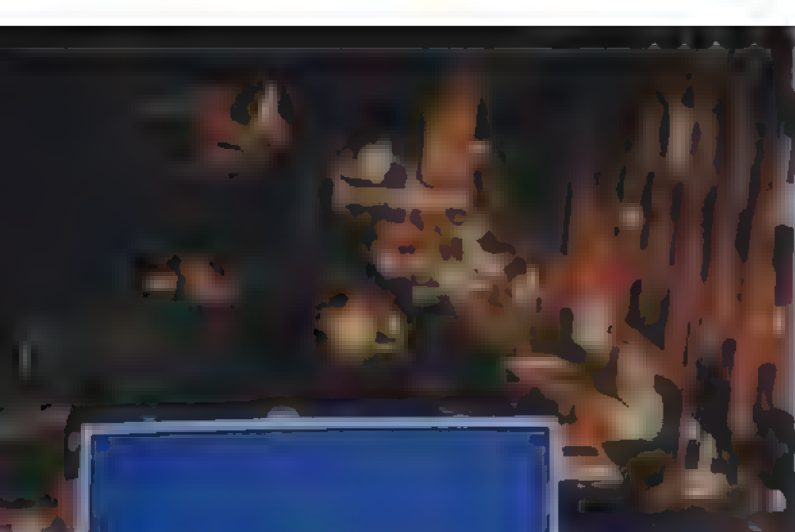
Jason and the Argonauts Models are brought to life by patiently adjusting them, and shooting them frame by frame for every movement

Trick photography

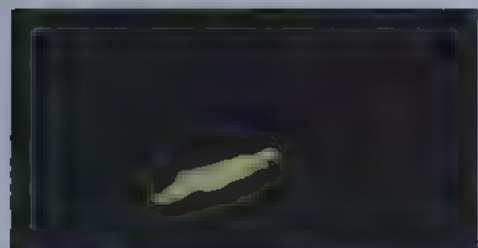
The basic techniques of trick photography can be used with even the simplest of home movie cameras. For example, by simply filming the action at a faster or slower rate than normal movement will appear to occur at a slower or faster rate when the film is projected. Another basic example of trick photography is the *jump cut*. Here the camera is stopped while a change is made to the scene and then restarted. If every other element remains the same then the cut will be undetected except

for a slight jerk in the picture. This technique can be used to create a variety of effects. For example, a model can be substituted for a real actor, so that the model can then be dismembered, blown up or otherwise violently dealt with. Television comedy shows make frequent use of such effects and they were used for such horrific scenes as in *Scanners* where people's heads explode.

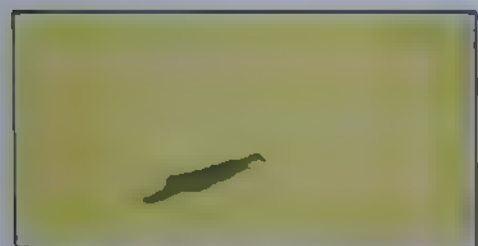
To make an object disappear slowly, a *fade* is used. This can be done in home movie cameras with a *dissolve* feature by reducing the exposure to fade out the first scene, then rewinding the film and fading in a second scene—with the object removed—by increasing the exposure from zero. In professional movie work, this effect is not performed



Superman, supported invisibly, is filmed against a blue background



A negative matte is made by means of blue-colour separation



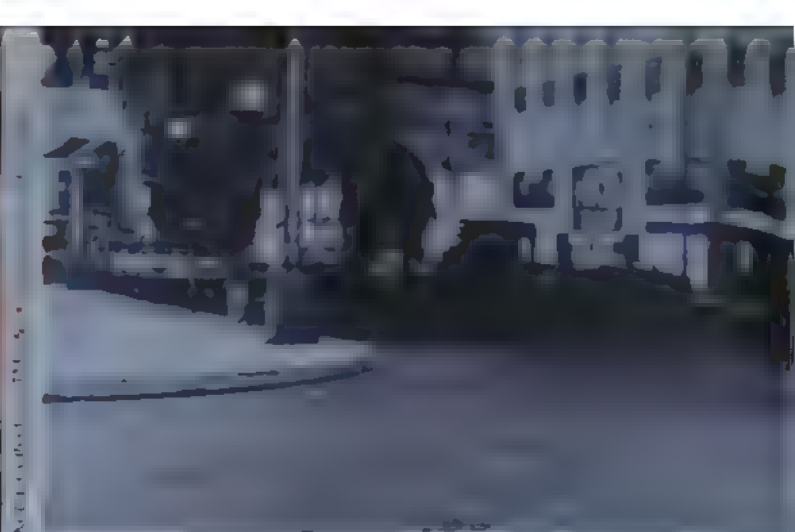
This negative matte is used to produce a positive counter-matte



The counter-matte leaves a perfect 'hole' in the cityscape film



Into this 'hole' the moving film of Superman is superimposed



When Superman flew, he was filmed suspended by a wire for a travelling matte. This sequence was then superimposed on a model scene using the blue backing system

In the 19th century, this method of time consuming instead of space and later scenes are superimposed on the first. This is done in the same way as in painting.

This is done using a special printer which is an essential tool for many special effects. The printer consists of a moving glass plate on which two films can be placed. A third film is placed in front of the plate. Instead of the camera being moved, the film is moved. The camera is moved in one direction while the film is moved in the opposite direction. The result is a perfect 'hole' in the film. This printer is used to animate and to make objects appear to move. It was once used to make the dinosaurs in early science fiction films. But it rarely looked convincing and it is now used sparingly in combination with other special effects techniques.

One of the directors who favours these effects is Ray Harryhausen, who used them in *Clash of the Titans* and in the battle of the skeletons in *Jason and the Argonauts*.

The use of very small apertures with their extreme depth of field allows small models to continue realistically with actors. By arranging the relative distances from the camera of the little ground model and the actor perspective can be used to alter their relative size at will. Precise positioning is the key to achieving convincing results. These perspective shots are created by art department's who work on the models. Scenery is then built to present the model camera with a false perspective. When ever movement is involved such as flames or waves the scene is often shot at a faster rate but projected at the normal rate. This slows down the motion and gives the scene the appearance of being larger than it really is.

Optical effects

Many of the optical effects used in movies such as the glass shot were first invented by still photographers in the 19th century. For this a picture is made on a sheet of glass which is then positioned in front of the camera so that it

Mini set This small scale set of the Metropolis was used interchangeably with another which was identical in every detail but life-sized

blends in with the background. The image reflected on the glass is then washed 'back' into the original scene used in the shot.

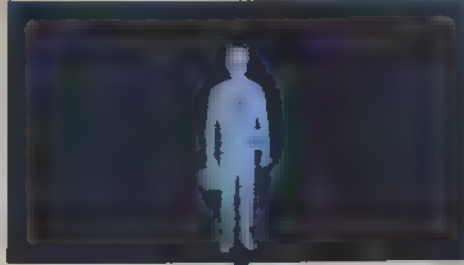
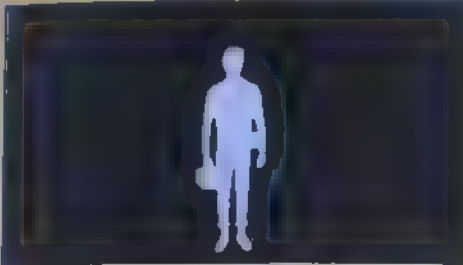
One of the most widely used effects is the matte shot which was first used since the early days of film. In fact, recently the matte has become much more sophisticated and simple than in the past. The matte is blanked out by a card placed in front of the camera lens. The card is then wound back and a new film is then filmed with the previously blanked portion of each frame. A second card whose shape is exactly the reverse of the first. This is called a counter-matte. The result is a double exposure where each exposure occupies a separate portion of the frame. In the days of silent films the technique was used so often that cameras had special matte boxes built on the front of them. These days it is more convenient to perform matting at the printing stage when the technique can be used with far more precision.

A variation of the matte shot is the 'hole' shot which makes use of a matte painting. After filming a scene with part of the frame matted out the part of the scene is transferred to another matte painting. We tried to prevent this from happening in the first place by using a glass. An artist then paints a scene usually back of a set and the set is painted. The scene is then filmed with the glass unpainted section of the set in front of the camera. The result is a scene as if it were a contemporary matte painting. A perfect example of this is the 'Grand use scenes' used in *Metropolis*, *History of the World Part I*.

A later development of the matte shot is the travelling matte which was used extensively in the Superman film. Here the scene is not a static scene but moves with the camera. Each part of the scene is filmed separately and then the camera is moved to the next part of the scene.

The way to achieve this is to use separate matte and counter-matte

Beam me down, Scottie!

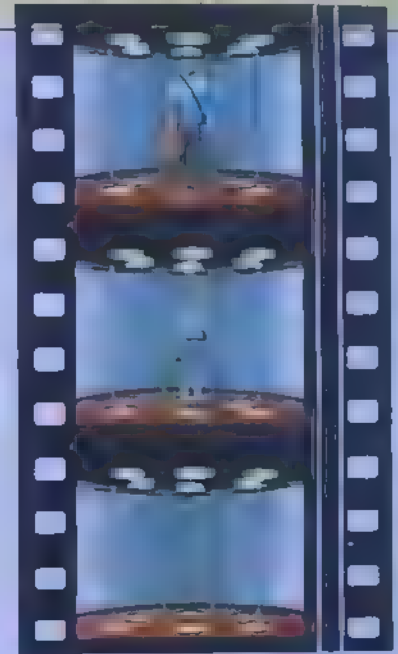


To achieve *Star Trek*'s famous beaming down effect, three different images are combined. Still photographs of the background with and without Spock provide the first and last images of the sequence. A moving shot of aluminium chaff falling (filmed upside down) gives the glitter effect. A matte is made by cutting around Spock's figure. Using this the image of Spock is gradually faded out while the glitter fades in. The glitter is in turn faded out and this sequence is then superimposed on the background. In the final sequence Spock's figure fades into glitter and then disappears.

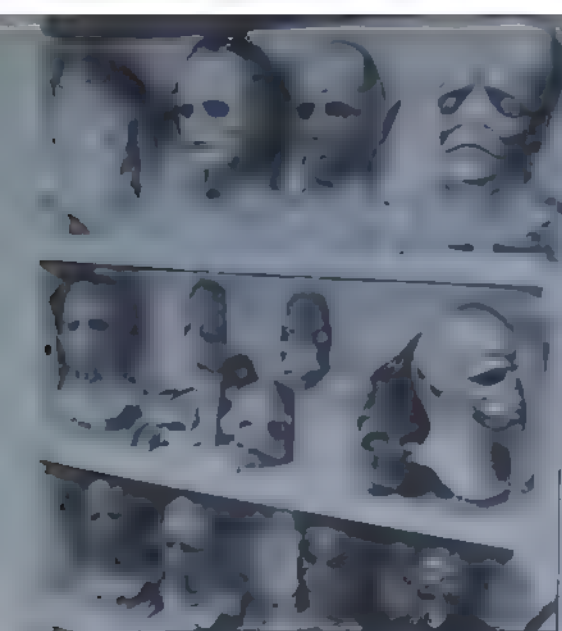
each frame by hand. This is a laborious process similar to cartoon animation, but it can be very realistic.

A quicker and cheaper method of making a travelling matte makes use of the basic properties of colour photography. In the *blue backing system*, the foreground action in a scene is lit with normal white light and photographed on regular colour film against a blue background. This is either a blue painted back cloth or a translucent blue screen lit from behind. The colour and lighting level of the backing is such that it produces an exposure only on the blue sensitive layer of the colour negative (a density greater than that of any part of the foreground). This means that you can make a blue colour separation of every frame which will form a perfect matte and counter-matte - the negative will be the matte and the positive the counter-matte. In *Superman* the hero's costume was coloured a deeper shade of blue so that it did not blend in with the light blue matte.

The matte and counter-matte reels are



Phased out Like many SF films, *'Star Trek II'* used models and computer controlled cameras to create this battle in space.



Masks Modern masks, such as these from *Star Trek*, are made from latex, which allows a range of lifelike movements impossible with cruder materials

run through an optical printer in synchronisation with the film in the camera, blanking out the unwanted portions on the final print. Double exposure is also used in video animation, in which a copy of a previously published film is on the blackboard. This is read by a reader running in front of the camera. The screen will appear to the viewer to be shifting in front of the television news pictures.

More traditional methods of combining a separately filmed item with a background are the techniques of front and back projection (see pages 21-22, 31-32). In back projection, the stand-in front of a translucent screen, in which a background action is projected from behind. The projector and the camera have to be synchronised so that one frame of the background is being projected at the same time as the shutter of the camera is open.

Bullet wounds For realistic gunshot effects small explosive charges containing artificial blood are detonated in the actor's clothing



John Fleming/Warner Bros./Victory at Entebbe

Some of the most modern techniques used in films like *Star Trek* and *James Bond* are computer graphics. The computer image is then superimposed on the background and the whole image is projected onto the screen. The computer image is then projected onto the screen and the whole image is projected onto the screen.

One of the most modern techniques used in films like *Star Trek* and *James Bond* are computer graphics. The computer image is then superimposed on the background and the whole image is projected onto the screen. The computer image is then projected onto the screen and the whole image is projected onto the screen.

The computer image is then superimposed on the background and the whole image is projected onto the screen. The computer image is then projected onto the screen and the whole image is projected onto the screen. The computer image is then projected onto the screen and the whole image is projected onto the screen.

Sometimes the image is also stored with a computer and is then projected onto the screen. The computer image is then projected onto the screen and the whole image is projected onto the screen. The computer image is then projected onto the screen and the whole image is projected onto the screen.

The computer image is then superimposed on the background and the whole image is projected onto the screen. The computer image is then projected onto the screen and the whole image is projected onto the screen. The computer image is then projected onto the screen and the whole image is projected onto the screen.

The computer image is then superimposed on the background and the whole image is projected onto the screen. The computer image is then projected onto the screen and the whole image is projected onto the screen. The computer image is then projected onto the screen and the whole image is projected onto the screen.

Computer graphics

These days computers can also be programmed to depict three dimensional images on a flat screen and then change these images so that they can be seen from other angles. Block colour can be added and entire cartoons can be drawn and animated with the aid of the machines without a single sheet of paper of celluloid being used.

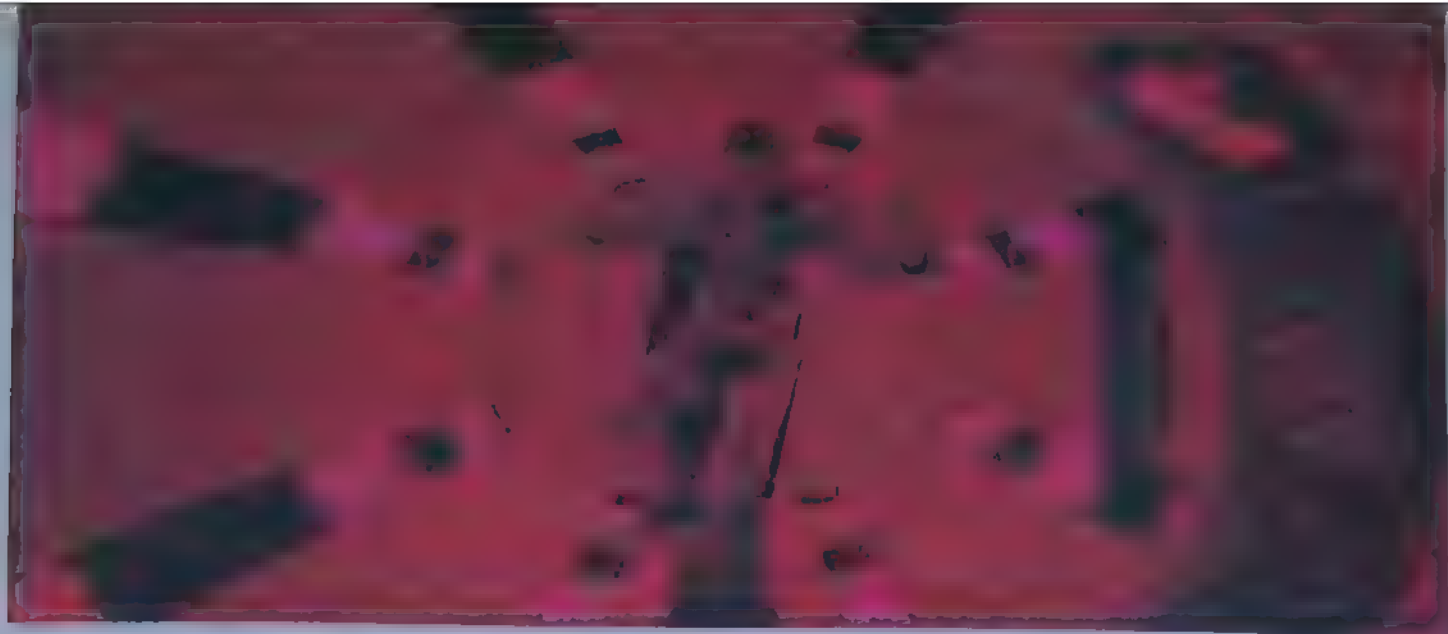
Until recently the resolution produced by these techniques was not fine enough to satisfactorily transfer these images to 35 mm film. But now using the latest digital computer techniques colour and intensity can be assigned to each of over two million points of light—or pixels—on a special computer screen. These flicker out the electronic images while the computer choreographs their movements frame by frame. This computer-created world can then be peopled by matting, as in the Disney film *Tron* and *Star Trek II*.

Computer graphics are often used in animation. The moving outline of these computer images are shot on black and white lith film and the negatives can then be used as cartoon 'cels' with the colour being painted in by hand.

Mechanical effects

Special effects in the movies embrace an area that lies well outside the area of photographic and optical trickery. Bullet holes appearing, blood spurting from wounds, buildings collapsing, all kinds of fantastic monsters and model making all fall into the classification of special effects.

Realistic bullet wounds were first used extensively in *The Wild Bunch* in 1977. The actor wears a small explosive charge attached to a plastic bag full of



'2001' The effect of weightlessness is achieved by filming vertically up a tunnel with the actor suspended on a rope and then slowing the film down

of the film. The effect is achieved by filming vertically up a tunnel with the actor suspended on a rope and then slowing the film down. The effect is achieved by filming vertically up a tunnel with the actor suspended on a rope and then slowing the film down.

The effect is achieved by filming vertically up a tunnel with the actor suspended on a rope and then slowing the film down. The effect is achieved by filming vertically up a tunnel with the actor suspended on a rope and then slowing the film down.

Computerized cameras This is one of two fully computerized motion control cameras used for special effects in films such as 'Superman' and 'Superman II' and in countless commercials

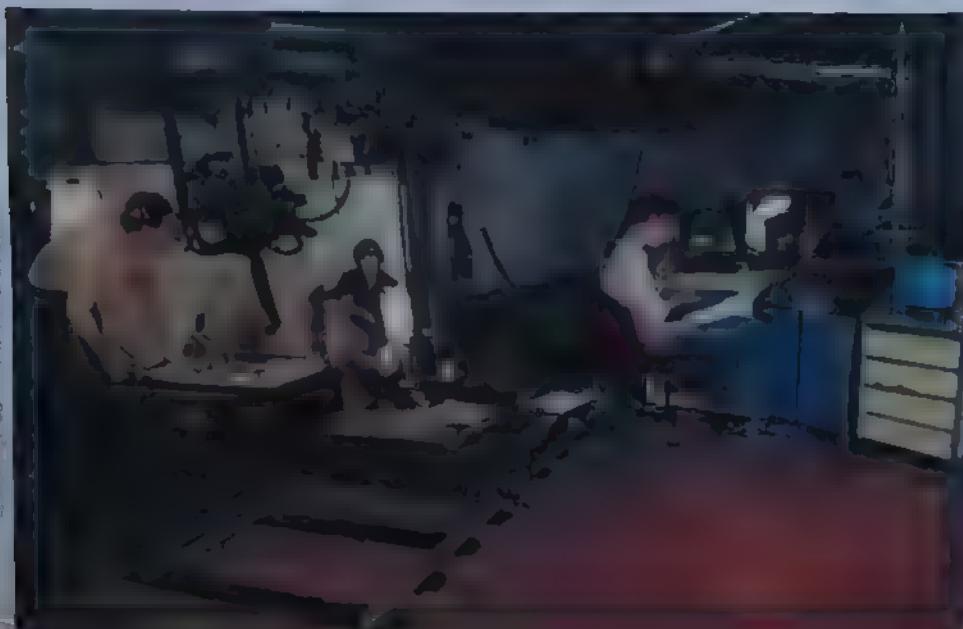
The effect is achieved by filming vertically up a tunnel with the actor suspended on a rope and then slowing the film down. The effect is achieved by filming vertically up a tunnel with the actor suspended on a rope and then slowing the film down.

Model effects

The effect is achieved by filming vertically up a tunnel with the actor suspended on a rope and then slowing the film down. The effect is achieved by filming vertically up a tunnel with the actor suspended on a rope and then slowing the film down.

Aerial image camera The height of special effects technology, this aerial image camera is used for a wide range of techniques such as split screen, optical zooms and travelling matte effects

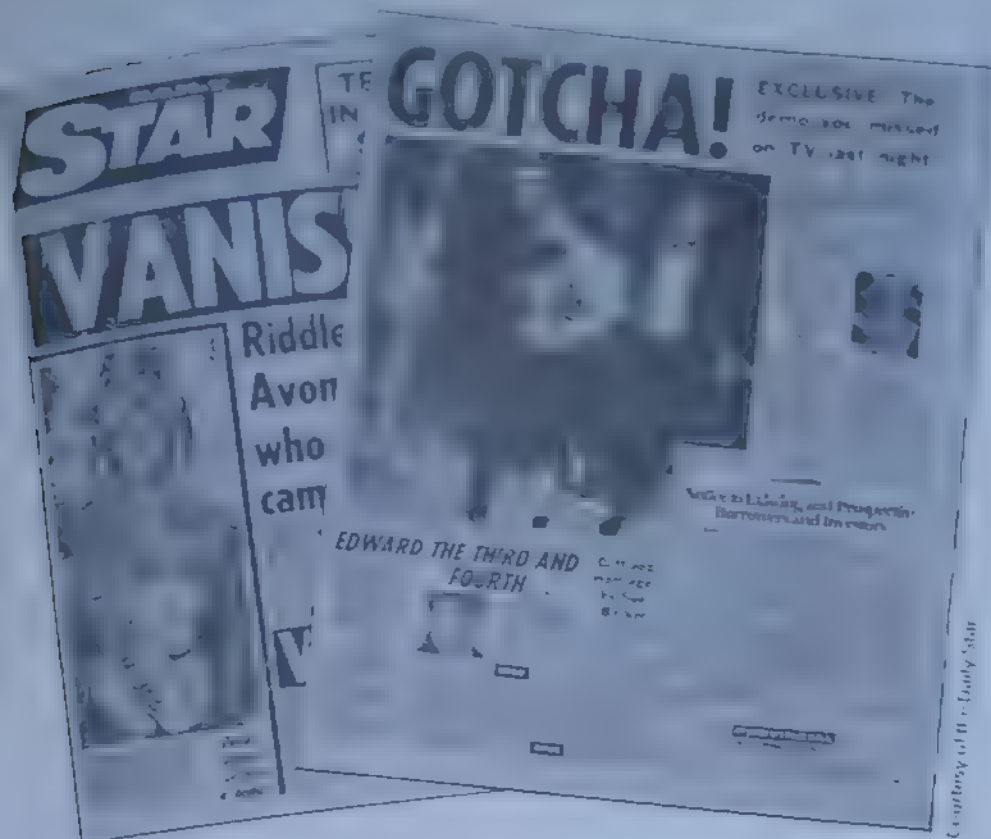
The effect is achieved by filming vertically up a tunnel with the actor suspended on a rope and then slowing the film down. The effect is achieved by filming vertically up a tunnel with the actor suspended on a rope and then slowing the film down.



Computerized Camera effects Ltd London

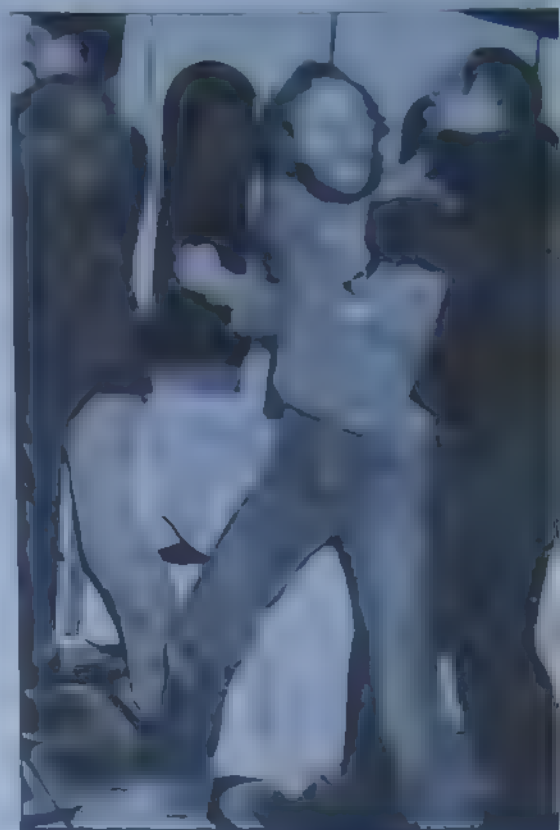


Dave King/Camera effects Ltd London



Beauty contest coverage Alasdair Loos was fortunate enough to be right on the spot when what promised to be a normal contest turned into a potentially explosive situation. Demonstrators stormed the stage and amid the confusion Alasdair rushed up to take as many shots as he could. The picture below left relies for its impact on showing the beauty contestant in such an odd context

The shot above right could appear much smaller as the raised fist gave it such impact. Alasdair also took several different formal shots of the winner two of which appear below. The Daily Star chose the winking shot which gave them a more unusual, jaunty front page shot

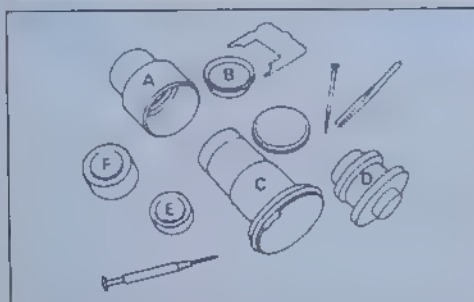


To give the kind of quality professional photographers demand nowadays, lens must be made to high specifications using the right materials. Only by sacrificing quality can the manufacturing process be simplified and the cost to the customer brought down

To give the kind of quality professional photographers demand nowadays, lens must be made to high specifications using the right materials. Only by sacrificing quality can the manufacturing process be simplified and the cost to the customer brought down



The "Mammals of the State of New York" is a book by John A. Rehn, published in 1908. It is a comprehensive work on the mammals of the state, including a list of species and their distribution. The book is written in a clear, concise style and is a valuable resource for anyone interested in the natural history of New York.



Internal focusing assembly for a 75-150 mm f/4 zoom. The diagram on the left shows: A—the focusing ring assembly, B—the front optics, C—the main frame into which the optics are mounted, D—the rear optics, E—the centre optics, and F—the zoom optics. Some zooms have as many as three sets of zoom optics moving at different rates and in different directions. These are more difficult to make but give better image quality

grooves into which pins slide. As the collar is rotated, the lens slides in or out on the pins. This is a simplification of the multi-start thread which is still used in some of the better lenses. It allows a much coarser movement than would be possible with a simple thread, so the full focusing movement can be achieved in a rotational movement of 45 to 90°.

Whatever the type of mount it is essential to retain an acceptable compromise between fine movement (which gives a greater accuracy in focusing but is slow to use) and coarse one which is quicker but less accurate. Simple, and successful, solutions (the early Elmas and still found in Russian lenses) enable the whole lens to rotate during focusing.

The *rectilinear mount* in which the cell moves to-and-fro without rotating is more expensive but more convenient. It is as well as making coupling easier it has nearly supplanted the *rotational mount*. For those focusing lenses such as the Micro Nikkor ~~and~~ helical mounts with concentric tubes are inter-

used, as soon as one rotation reaches the limit of its travel, the other starts turning.

On most modern lenses the diaphragm is operated automatically by pressing the release button. Because of the need for speed, modern diaphragm leaves tend to be fewer in number than previously. This ensures that we need no inertia are kept low. Usually the leaves are lubricated by being coated with the plastic PTFE Teflon, which is in use which can bind. On older and many lenses it is possible to use a stiffer diaphragm with more leaves, so they approximate more closely to an ideal.

The camera's lens brackets are numerous and new ones are introduced frequently. First there was the auto-diaphragm pin or lever. Then came a maximum aperture teller and diaphragm teller for full aperture TTL (with metering) tellers in date to the camera or meter mechanism, what setting to use. Now to these are added dedicated flash tellers, servo flash pins, focal length tellers, autofocus tellers, and more. Increasingly this information is relayed

electronically which is a much better solution than the very complex system of tiny protrusions and holes used earlier.

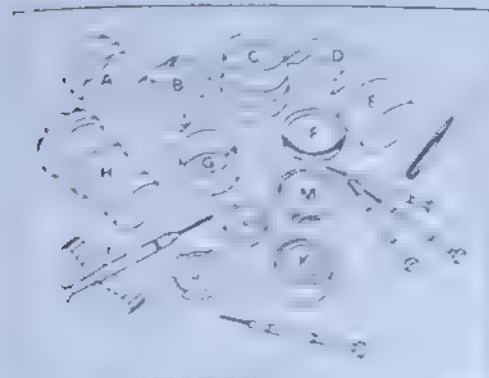
In some zoom lenses the zoom movement is controlled by a single piston/pull action but less and less similar to those used for focusing is more usual. Thanks to modern technology controlled cam cutting machinery is not unusual to move three group elements at different rates and in two different directions. This gives better compensation for changing focal length and results in better image quality.

Zoom lenses focus by moving more groups of lenses in and out, and this technology is also used for lenses of fixed focal length. In some lenses for internal focusing and in other float (or element moves during focusing) focusing to maintain contrast the lens is focused by several expensive arrangements and is only found only on expensive and highly corrected lenses.

Shift lenses normally describe the lens body with a simple design, with some form of track and a lever for fine control. The main aim is so that the decentering movement serve as a cross front element in the front of a combination of lenses. It didn't seem important to have a very accurate, precise, and stable, normally a fine adjustment.

If there are no more possible to be a more precise

Assembly and testing



Zoom interior A dismantled 75 mm zoom and some of the tools used in lens assembly. The diagram shows A—the zoom ring, B—the P ring, C—focusing ring assembly, D—caliper tool, E—lens hood, F—front optics, G—frame 'zoom' guide, H—main frame, I—lens tool and rubber grip, J—rear mask, K—zoom optics, L—centre optics, and M—the locking spacer. Careful assembly of these parts is vital for correct alignment. However good the materials used, the tiniest discrepancies in assembly can seriously reduce lens quality and the reliability of the mechanisms.





Name: _____
 Date: _____
 Rooming the night: _____





Fireside chair In a room with large windows, especially in the ones there are many, it is not for shades. Exposure of the room may be difficult, so the fire carefully.

Butter Getting the farmer to hold his butter, so that the butter in his arms stand out, and also moving in with a wide angle helps to bring out the fullness of the butter round.

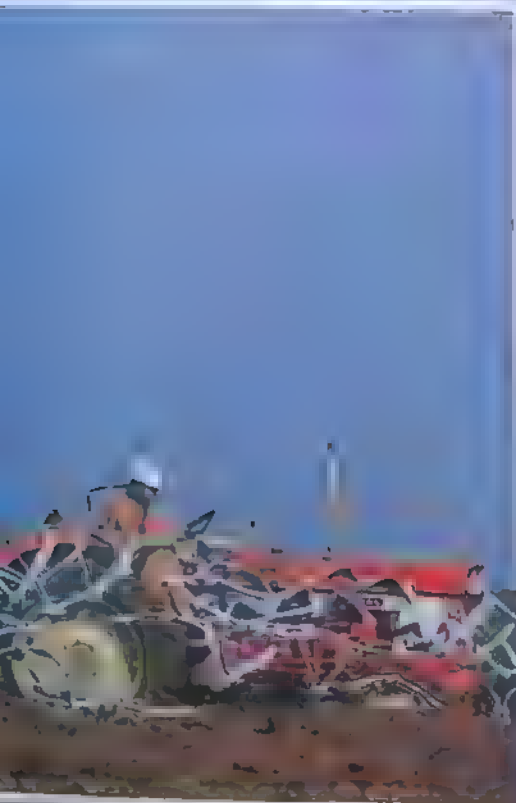




Gulls The kind of photographs you can take depends largely on the time of year. This shot was clearly taken during the ploughing season – the wheeling birds make the shot

Prize pig Most farmers will be only too pleased to pose for shots with their finest produce. Sending a copy or two returns the favour and may make you a friend

Cow Straight record shots of farm animals are invariably uninteresting so look for a new approach, such as moving in close with a wide angle



John Sims





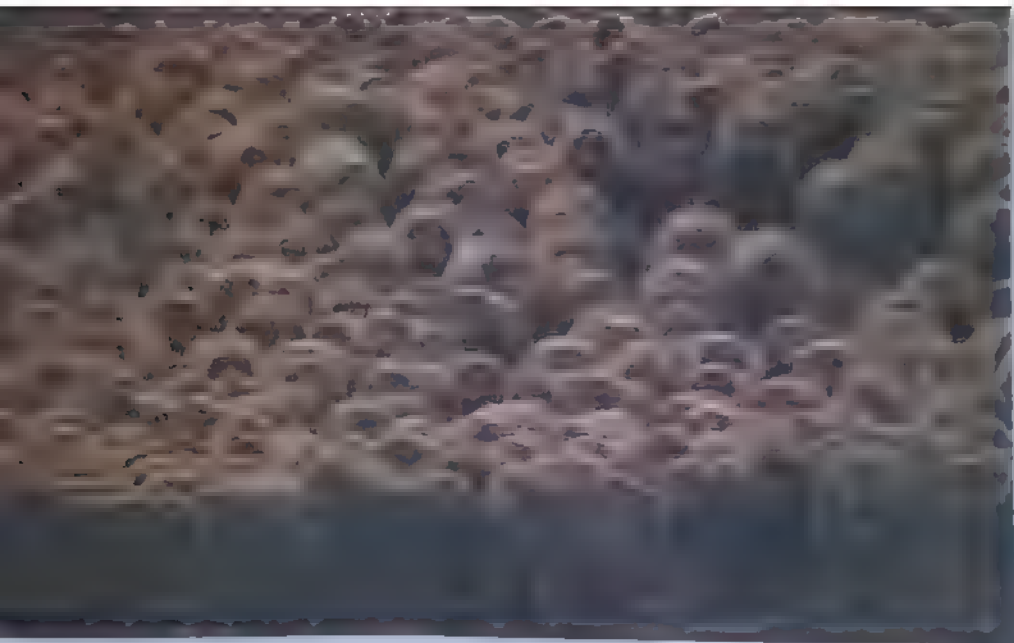
Ploughing The rich golden light resulting from shooting into a setting sun gives a nostalgic feel to this shot of a disappearing aspect of farming

A large, dark, and somewhat blurry photograph showing a person ploughing a field with a horse. The scene is dimly lit, with a strong golden light source from the right, creating a silhouette effect and highlighting the dust or steam rising from the plough.

The rich golden light resulting from shooting into a setting sun gives a nostalgic feel to this shot of a disappearing aspect of farming.

Tractor Take full advantage of times when the sun breaks through dark cloud – the colours of the countryside are never more intense





Creative approach

Flock ... into the light and framing
... has registered
...
...

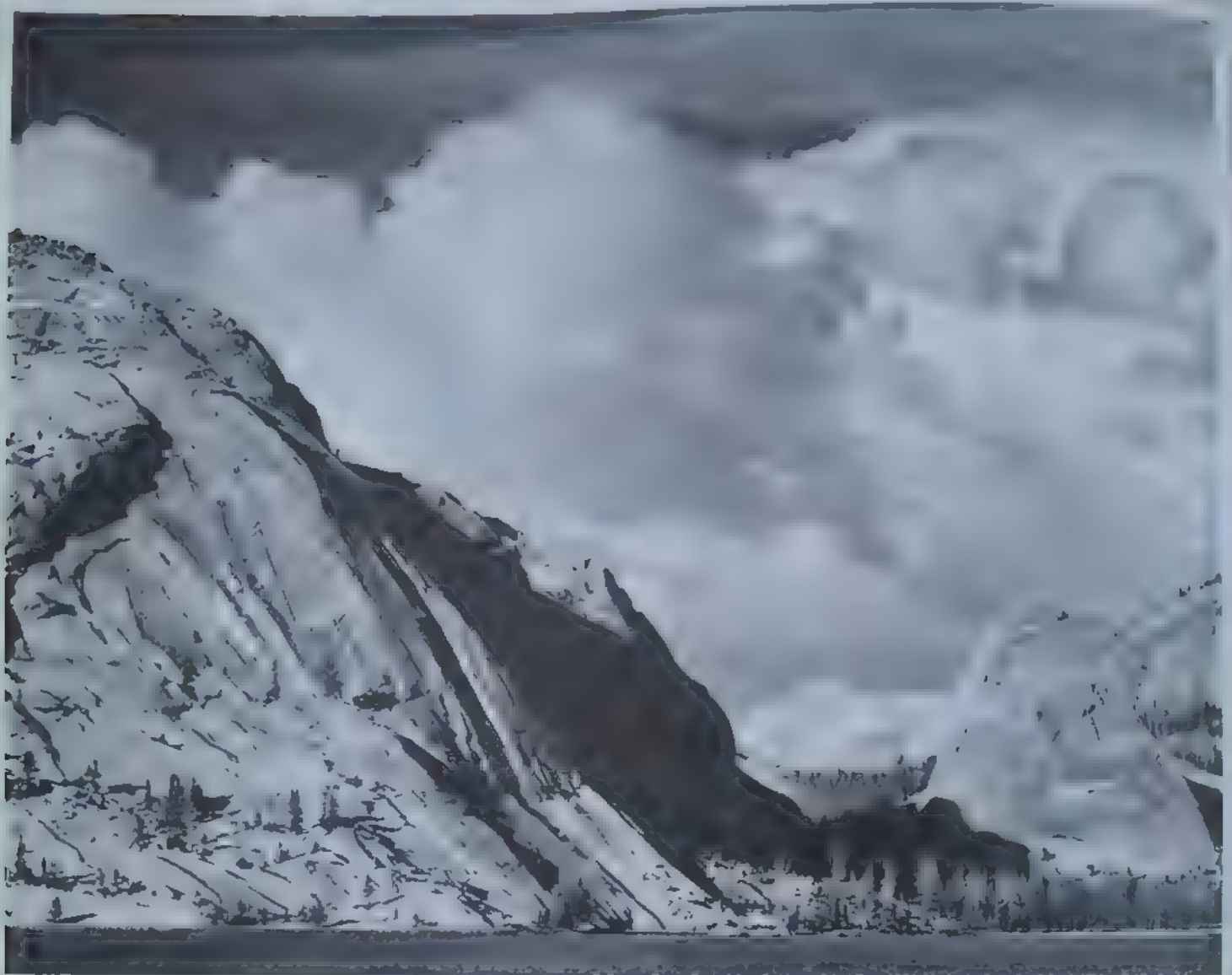
Cart wheel The
subtle textures and
colours of old farm
machinery can make
attractive shots
particularly if you
include a few of the
locals



Improve your technique

Precision exposures-2

For the best possible exposures with b & w film, the 'zone' system is unbeatable. Though the full system is difficult to set up, there is a simpler version which still gives superb results



Of all the techniques for metering and exposure, the zone system is the most advanced—and the most complicated. Originally developed by Ansel Adams in the 1940s, it is intended mainly for black and white work, and involves preliminary darkroom work to set up the system. But once you have mastered the system, you will find that your understanding of exposure and your control of tones is much better.

The system is based on a scale of fixed tones—or zones—each of which is given a number (see box). By relating zones in the subject to tones which will appear in the final print, and relating both to an exposure meter reading, it is possible to finely control the range of tones in your pictures, and so get the most out of the materials. To enable you to do this,

your film processing and printing procedure must be standardized. And even the film itself may have to be altered to suit your own set-up and equipment.

First steps

Start in the darkroom to see what information a normally developed negative produces. Mark on the enlarger column a height for the enlarger which produces a convenient print size. Marking it allows you to repeat the test accurately, though you should also make extensive notes of everything that you do.

Having chosen a convenient aperture—say $f/8$ —make a test strip using the unexposed edge of a negative or, better still, an unexposed frame. This means

Fine print By using the zone system with large format film, Ansel Adams achieved superb quality in his prints

that the density of the negative is just base density plus fog. It is important, though, that the film stock and development are strictly standard.

Make the test on grade two or three paper (whichever you use, you should use the same grade for all future prints). Give several exposures, increasing by two seconds each time and develop fully. When dry, examine the result under a bright light. If the exposure is about right, at some point the tone steps become dense black and indistinguishable from each other. This is the deepest black of which your system is capable—zone 0. The exposure time for the first of

Develop and print as for the other tests. The result is a series of prints from deepest black to pure white demonstrating the full range of tones. Trimmed neatly, these can serve as a reminder of the tones your equipment will produce. Of particular interest are the differences visible between zones 1, 2 and 3, and

6 Use the zone ruler to decide what tone you want an object to be. Then meter the object and use the index mark on the dial corresponding to that zone



zones 7, 8 and 9

All of this assumes that the development in fresh developer is not quite right. You might find, for example, that although zone 5 is a reasonably good match to the grey card, and zone 0 (or 1) is a good deep black, zone 9 may not be pure white. This implies that the development should be increased slightly to produce a denser negative result for the highlights. This slightly alters the density of zone 5, but hardly changes the darkest zones at all.

Whenever you have a few frames left

in a roll, it's a good idea to make a test exposure of the zones. If you find that the results are not what you need, you can apply the results in the field—for example, when you need lower contrast for contrasty subjects.

Using this method to control contrast is much more accurate and predictable than any other technique—certainly

much better than just guessing. What many photographers find, however, is that these procedures may seem complicated, but they are an important part of being able to predict the results of your exposure.

Using the system

Compared with setting it up, the system is fairly simple. You are well acquainted with the process, so it is a good idea to carry the system with you, especially when you

Zones and tones

The zone system divides the intensities of the objects in any scene into a number of bands or zones each double the brightness of the previous zone. The zones are numbered from 0 to 9 as follows:

Shadows

- 0 The deepest black of which the paper is capable
- 1 The darkest tone distinguishable from black, but without texture visible
- 2 Adequate texture in dark materials

Middle greys

- 3 Dark mid tones, such as dark leaves or shadows in portraits
- 4 Standard middle grey - 18 per cent reflectance. Clear blue north sky
- 5 Light mid tone. Average white skin in sunlight or shadows in snow

Highlights

- 6 Very light areas, but with texture clearly visible
- 7 Almost white, with very little or no texture. Brightest reflections in face
- 8 Pure paper base white with no detail. Snow in sunlight and bright reflections in, for example, chrome

This scale represents a tonal range of 512:1 for the negative, which is reduced to about 50:1 in the print. It is possible to adapt the zone system for use with colour transparency film, but you will find it necessary to use a different set of zones. Transparency film records a tonal range of only five stops, so the zones above should be grouped in pairs (0 combined with 1, 2 with 3, and so on). You should also use a more limited range of index marks on the meter (see page 2479).

The first approach to the zone system which has a range of 512:1 is the one used by Ansel Adams. The zone system is based on the fact that the human eye can distinguish about 100 different tones. The zone system is a logarithmic scale, and the zones are simply pure black and pure white, and will rarely need to be metered for. In any case, with 35 mm photography, zones 0 and 1 often merge, as do zones 8 and 9.

The basic metering method is to first decide what zone you want a particular object tone to appear in. Say, for example, you want a flower to reproduce as zone 3. You should meter from the flower going very close if necessary to avoid metering other objects as well. Then use the mark corresponding to zone 3 as your exposure index.

The other object tones will arrange themselves according to their brightnesses relative to the flower. But you may find that the range of brightnesses is too great, or that you lose detail in another important object.

It is worth, therefore, taking readings from the brightest and darkest objects in which you want detail to appear. If both of these fall outside the normal range of zones you should either reduce development to compress the tonal range, or be prepared to sacrifice detail.

Alternatively, you may find that the range of zones is not very great. The brightness range might only be from 2 to

Using the zone system with flash

The zone system can help predict how fill-in flash will operate. Consider trying to photograph a person while the light is harsh. The meter indicates a difference of three stops between the highlight and shadow details. If the brighter parts of the face are placed on zone VI as they should be, the shadows will fall on zone III—almost featureless. If a flash gun is used to add light to the shadows a simple diagram can be drawn to show what will happen. A flash gun at normal power will give 16 units of light contribution to the scene—in other words a zone V amount.

zone No.	I	II	III	IV	V	VI	VII
equivalent units of light	1	2	4	8	16	32	64
metered subject			shadow		highlight		
add flash, 16 units			16		16		
Total resulting			20		48		

The facial highlights are now at 48 units, about zone VI $\frac{1}{2}$ whereas the shadows have moved proportionally more, from 4 to 20 units, ending up on zone V $\frac{1}{2}$. The overall exposure could be cut $\frac{1}{2}$ stop to place highlights in zone VI.

Just over a stop difference between highlight and shadows may be thought too little (too much fill in) so draw another diagram to find out what will happen if a half power flash is applied. Half power equals 8 units of light.

zone No.	I	II	III	IV	V	VI
units of light	1	2	4	8	16	32
metered subject			shadow		highlight	
add flash, 8 units			8		8	
Total resulting			12		40	

The difference between the two is just under two zones, about correct, and the added light would not require a decrease in exposure as between 32 and 40 units is only a quarter stop.

Ansel Adams

Ansel Adams (right) is the father of the zone system. Using this system enables him to produce pictures with stunning tonal ranges which, when combined with his undoubted creative talents, result in prints with great intensity and power. Original Adams prints are among the most expensive on the market, some fetching as much as a luxury car.

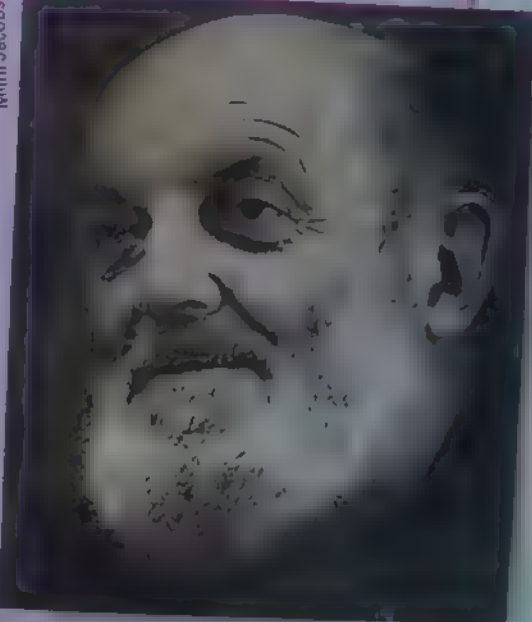
To get the utmost quality from his b & w film he uses large format cameras, usually 5 x 4 and 10 x 8 inch. But his introduction to photography was much less auspicious.

It was in 1916, at the age of 14, that he first took up photography. His imagination was fired by the great vistas of the Yosemite Valley in California, and he attempted to record these using a box Brownie. He studied photography assiduously and quickly mastered the basic techniques. By the mid 1930s he had made his mark as a leading American photographer, highlighted by a one man exhibition at Alfred Steiglitz's gallery, *An American Place*.

The main influence on Adams was Paul Strand, and he collaborated with people like Edward Weston, who all shared a love of the fine print. Two of his most important photographs—*Banner Peak* (1923) and *The Half Dome* (1925)—were steps on the way to realizing that the photographic medium is a craft which needs to be carefully controlled and understood. To this end he developed the zone system—a method which demands that the photographer be aware of the precise effects of exposure and development.

The zone system has been known to inspire

Mimi Jacobs



almost fanatical devotion in some of its most ardent followers who tend to rate technical quality above aspects such as interesting subject matter or good composition. Nevertheless the Zone system remains, forty years on, the standard technique for ultimate print quality.

Understanding...

Silver recovery



At one time, silver recovery was only possible for manufacturers and large processing houses. But today, even amateurs who process their own films can reclaim the silver that would otherwise be washed down the drain

When you develop your own film, you know the drill. You pour the developer, stopper, fixer, wash, and then you pour the fixer down the drain. But what if you could recover the silver that's washed down the drain? It's not as simple as it sounds, but it's possible. The silver in the fixer is in the form of silver ions, which can be recovered by a process called silver recovery. This process involves adding a chemical to the fixer that will precipitate the silver as a solid. The solid can then be melted down and reused as silver. This process is called silver recovery, and it's a way to save money and reduce waste.

There are several ways to recover silver from fixer. One way is to use a chemical called sodium cyanide. This chemical will react with the silver ions in the fixer to form a solid silver cyanide. The solid can then be melted down and reused as silver. Another way to recover silver is to use a chemical called sodium thiosulfate. This chemical will react with the silver ions in the fixer to form a solid silver thiosulfate. The solid can then be melted down and reused as silver. Both of these methods are effective, but they can be dangerous if not done properly. It's important to follow the instructions carefully and to wear protective gear when working with these chemicals.

There are also some commercial silver recovery services available. These services will take your fixer and recover the silver for you. This can be a convenient option if you don't want to deal with the chemicals yourself. However, it can be more expensive than doing it yourself. If you're looking for a way to save money and reduce waste, silver recovery is a good option. It's a way to get the most out of your fixer and to keep your silver supply going for a long time.

Each of these 1-ounce bars contains enough silver to make over 100 colour negative films

Metal exchange

There are also some commercial metal exchange services available. These services will take your metal waste and exchange it for new metal. This can be a convenient option if you don't want to deal with the waste yourself. However, it can be more expensive than doing it yourself. If you're looking for a way to save money and reduce waste, metal exchange is a good option. It's a way to get the most out of your metal waste and to keep your metal supply going for a long time.

Silver Grabber The main principle of the Silver Grabber is that silver collected on the plate it can be removed by flexing the plate so that silver flakes fall off

thicker no matter how long you leave the coin in the fixer. A more worthwhile method of recovering silver is therefore to use a material with a large surface area such as very fine steel wool.

The spent fixer is filtered slowly through a vessel containing the steel wool which must be free from grease. All the silver will be removed from the fixer leaving it charged with iron salts. The fixer must spend a long time in contact with the steel wool, and the silver sludge left on the wool may smell badly, so this technique is not very convenient. The silver plated steel wool is sent to a refiner for reclamation of the silver.

If, say, a 250 litre container of spent fixer can be accumulated over a period containing perhaps 2 g/litre of silver, this works out to be about 500 g of silver that can be reclaimed. The price of silver fluctuates, but 500 g is worth about half the cost of a typical SLR. So even allowing for the cost of refining, the very active amateur may find silver reclamation worth while, particularly if several people combine their output.

Chemical methods

Silver can be deposited from exhausted fixer in the form of silver sulphide sludge by adding a solution of sodium sulphide. The fixer has to be made alkaline by the addition of sodium hydroxide before this is done. As noxious and toxic fumes are given off this is very much an industrial process and not for home use.

A sludge of metallic silver can be precipitated with sodium dithionite (hydro-sulphite), a process which is free from smell but is costly.

Electrolytic silver recovery

Metal exchange or chemical methods cannot be used if it is wished to extend the life of a fixer or to regenerate it for further use. Both large and small scale users of photographic material can now use various electrolytic methods, in which an anode of carbon and a cathode of

stainless steel are immersed in the fixer and a carefully regulated current passed between the two. Pure silver is plated on the cathode. If the current density is too high silver sulphide is formed which makes the bath unsuitable for further use and prevents effective silver plating.

Regenerating a desilvered fixer involves adding fresh concentrated fixer to counteract the losses resulting from carry-over of rinse or stop bath into the fixer and fixer into the wash water. The addition required is that

necessary to bring the specific gravity of the solution back to a specified value. Addition of sodium metabisulphite may also be needed to prevent staining by any developing agents carried over into the fixer which are decomposed at the anode. An efficient stop bath helps to prevent this but it is not generally recommended to use a regenerated fixing bath for prints because of the risk of staining.

Galvanic silver recovery

This is essentially an electrolytic method but it

does not demand an external current source. Two dissimilar metals in contact with each other, such as stainless steel and zinc, are placed in the fixer while it is in use. The silver plates out on the stainless steel from which it can be removed in flakes of high purity. A commercially available unit consists of a metal plate to which are attached metal discs in plastic shells. These have to be changed at intervals as they become inactive after a period of use. This is a suitable recovery method for the small user and it calls for no complicated maintenance. It permits the reuse and regeneration of desilvered fixer, though there is a chance that the silver may be contaminated by zinc when it is removed.

Silver and rapid fixers

The build-up of silver in ammonium thiosulphate based rapid fixers does not slow down the rate of fixation and much higher silver levels can be tolerated—up to 5 g/litre for prints and as much as 10 g/litre for films. Desilvering such a fixer does not extend its life unless it is regenerated afterwards. The same methods of silver recovery that are used for sodium thiosulphate can be used for ammonium fixers.

There are various devices available, some being mains operated and some requiring small batteries. The units should repay the outlay within a year or two.



Tessa Mugrave equipment courtesy of Peering & Cross

Silver Spoon A self contained battery powers this unit, which must be completely immersed in fixer. Silver can be scraped off the blade



Tessa Mugrave/equipment courtesy of Peering & Cross



Darkroom

COLOUR VISUALS

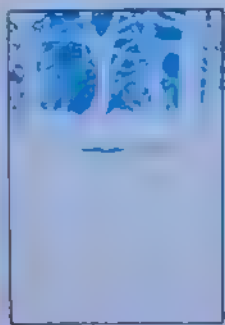
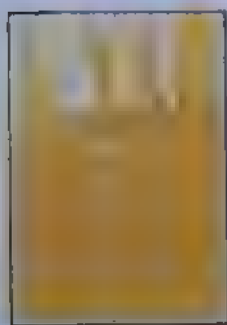
Simple and easy to use, two graphics arts films—Color-Key and Image and Transfer—give bold, brightly coloured images that can be graphic indeed

Color-Key is designed primarily for graphic arts reproduction, but it is very simple to use and its bright, strident colours make it an attractive way of making pictures from all kinds of original. A single Color-Key film will only give one colour, but by combining films, you can produce multi-coloured images.

Images can be produced from any original providing it is translucent. At one extreme you could try making photographs of glass-like objects, leaves, fabrics and textured screens. At the other, simply use normal black and white—continuous tone or lith negatives for bold, stark abstracts. In the graphics field it is easy to produce coloured images from tracings, pencil drawings and dry transfer work. The result in all cases is a line image in the film colour you have chosen.

Images on the transparency film can be mounted on plain or patterned white or coloured backing material, such as card or metallic foil—just like ordinary lith film can be. Two or more transparency films can be bound together to form a multi-coloured image which can be used either as a slide for viewing or projection—or as a negative if you wish to continue printing and derivation work.

As Color-Key can be handled safely in



Pick 'n mix Color-Key films in several colours can be combined to form a colourful image. Images a, b, c, d, e and f were used for the picture above. Images c, e, f and g were combined with a lith original for the picture on the right.





Tree A lith film image forms the basis of both these bas-reliefs, which show the colourful potential of Color-Key even when backed by ordinary white card

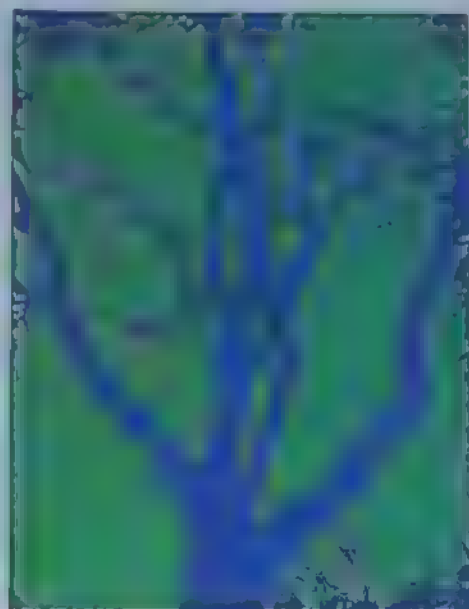
low light and offers further printing possibilities which is a big part of traditional tripack film material. In many derivation processes, for example, a lot of tone or colour separations, rather than continuous tone material, could be contact printed on the appropriate Color-Key film to produce interesting colour posterizations when the individual films are combined. The same Color-Key films could also be set out of register for a bas-relief effect. In each case the combination could be copied using a camera or enlarger arrangement or conventionally contact printed on direct reversal print or film material. In this way each component of the image may be rescued.

Color-Key films are available in a range of over 30 different individual colours, either as negative-acting transparency—clear based after development—or as 'opaque' (nine colours only). Positive-acting transparency film is also available in nine colours. The standard size of Color-Key sheets is 254 x 303 mm, but some are available in sizes up to 606 x 960 mm. A pack of five sheets in the standard size costs much the same as three 20-exposure Kodachrome films. A rainbow pack of 25 sheets costs about the same as ten rolls.

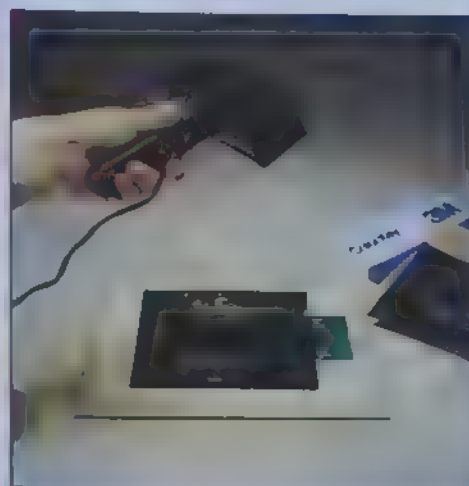
Using Color-Key

As the emulsion used in the Color-Key film is too slow for normal enlarging, contact printing methods are used. So the first stage is to prepare these originals for printing. Use high contrast originals such as those made on lith film to help along the high contrast effect you obtain using Color-Key.

You need a negative original to obtain positives when using negative-acting Color-Key film, and a positive to obtain a positive image with positive-acting film.



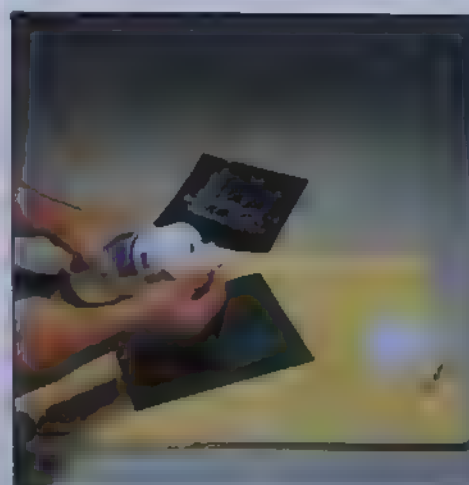
Using Color-Key



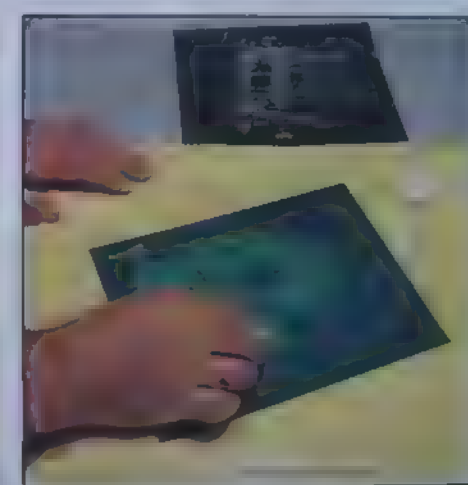
1 Use full-size negative or positive originals suitable for contact printing. You can use a UV lamp or movielight or bright daylight to make the exposure



2 The special exposure unit available as a component of the Color-Key system is especially useful for consistent results and short exposure times



3 Place the film emulsion upwards on a flat tray (such as this one, which comes with the complete outfit). Soak a fresh ball of cottonwool with the developer



4 Firmly but carefully swab the entire emulsion area with developer and continue rubbing gently until the unexposed parts have been removed

violet-rich light source. The most convenient method is to use a UV lamp or quartz halogen movielight—with appropriate safeguards. Exposure times will depend on lamp power and the distance the lamp is held above the contact printing set-up. You can use bright sunlight but make sure the printing set-up is firmly clamped to a carrying board so the original cannot slip in relation to the film. Simply place the board on a sunlit windowsill—or outside—for three minutes. Experiment to find the ideal time whatever exposure method is most convenient.

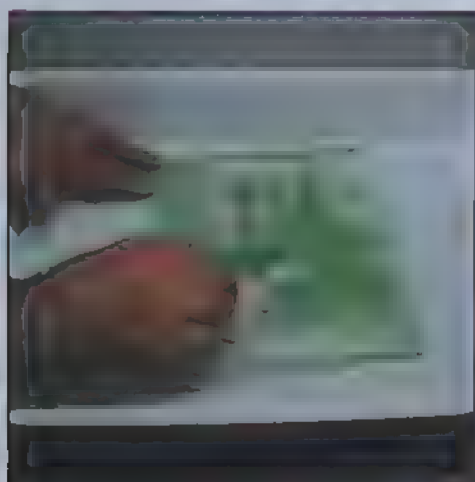
A special 'lightbox' desk top exposure unit can be bought as a component of the Color-Key system. Because it is a precisely controllable form of UV illumination, it can be very useful if you plan to do much Color-Key work—or other darkroom work which relies on UV for exposure, such as old printing processes.

receive sufficient exposure removal in the ensuing days.

Place the film emulsion face up on a shallow bottomed plastic tray. Pour a little special Color-Key developer (available in litre bottles) on to a cotton wool or buckle brush and wipe the film with light, even pressure to remove surplus colour—but take care not to scratch the developer which remains. Then rinse the film to clear the film—a running water tap is useful here. Start by rinsing at the emulsion side, then flip the film and rinse the shiny side. Keep the water at about room temperature. Empty the tray and, after using a flat bladed squeegee to wipe down the shiny side, lift the film carefully by its edges and place it on a sheet of photo blotting paper. Do not squeegee the emulsion side—simply blot it and leave the film to dry.



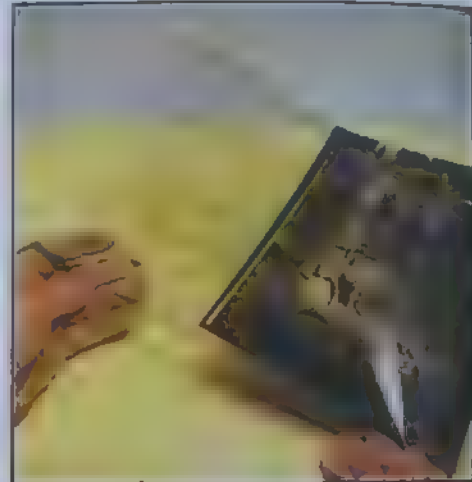
John Ward



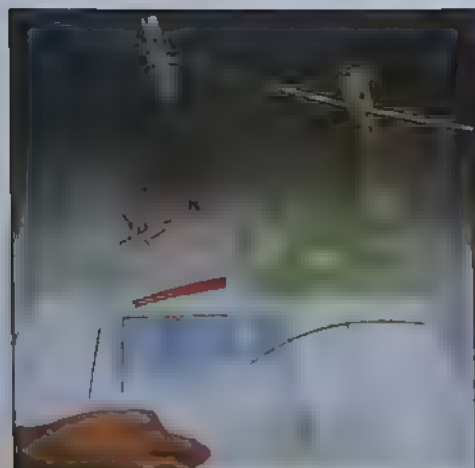
5 Transfer the film to a rinse bath of cool water, wiping carefully with a fresh ball of cottonwool. A sheet of glass forms a useful smooth work base



6 Flip the film over on the glass and remove the two from the rinse. Mop or squeegee the shiny side dry, flip the film and carefully blot the emulsion side



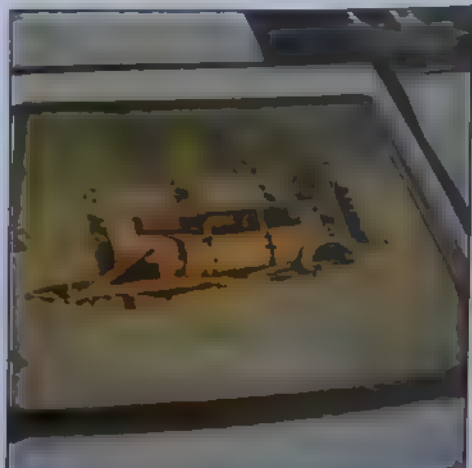
7 Compare the result with the original and decide, on the basis of the amount of detail which has been removed, whether a different exposure is needed



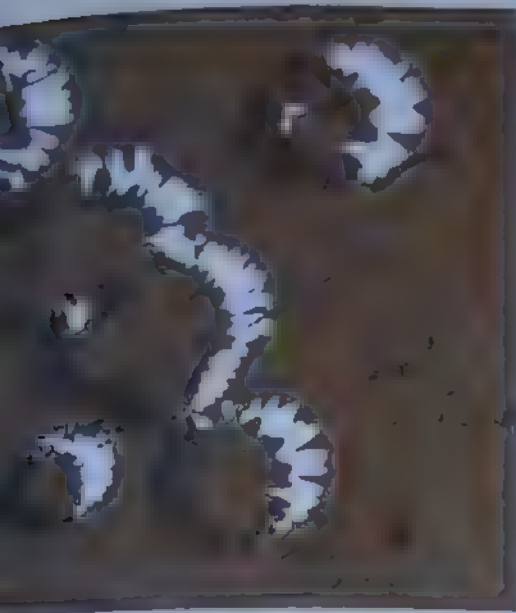
8 Then proceed to expose other colours which may be needed for a combination. These can be made from other originals—or from the same one used initially



9 Check out the combinations on a lightbox before taping films together ready either for copying or for display. Other possibilities may become apparent



10 Here is another variation, produced by combining a blue sky image with green and red details. All images come from a 6 x 7 transparency original



Daisies Negative and positive high contrast originals were contact printed on the same sheet of Color-Key, and the resulting images combined to form this bas-relief slide

When the film has dried—this does not take long—check the image on a lightbox. See if the required fine detail has been retained—if not, increase exposure next time. If the film colour image is largely removed, greatly increase the exposure and—in really severe cases—adjust either the method or the means of making the exposure. If unwanted parts of the image cannot be removed during development, reduce exposure substantially. But it is worth checking that the film has not been exposed to bright light during storage.

Different colour positives enable you to experiment quickly and inexpensively with different colour overlays. With reverse-outs or tone drops you can add colour within colour as well as superimposing those in a straight forward overlay.

For another variation, try using negatives of different density made from the same original. Print a different Color-Key for each and superimpose these to obtain a colour posterization effect!

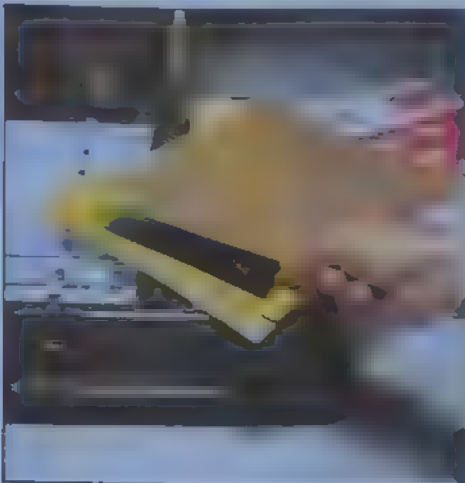
For really elaborate multicolour work start with a black and white line original and selectively mask off various areas as you print off each colour.

The combination can then be copied—or simply mounted on white or coloured card or foil as a finished image.

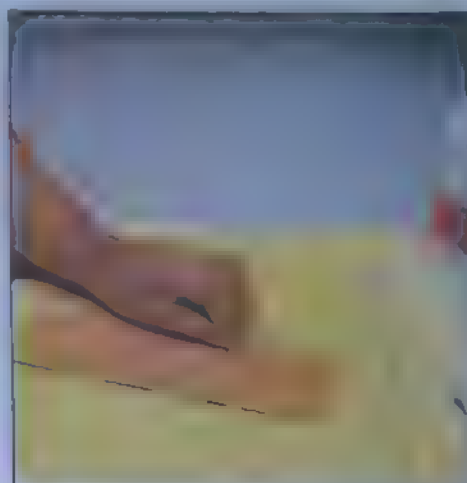
As the Color-Key film is extremely thin, you can easily print from any sandwich. But take care to keep such a stack of Color-Keys free of dust and hairs. Interesting effects can be obtained by switching the stacking order of Color-Key used in this way.

Using opaque Color-Key follows exactly the same exposure and developing routines. Special colourants can be used to enhance the monochromatic line image which cannot effectively be combined with other opaque films.

Making your own dry transfer



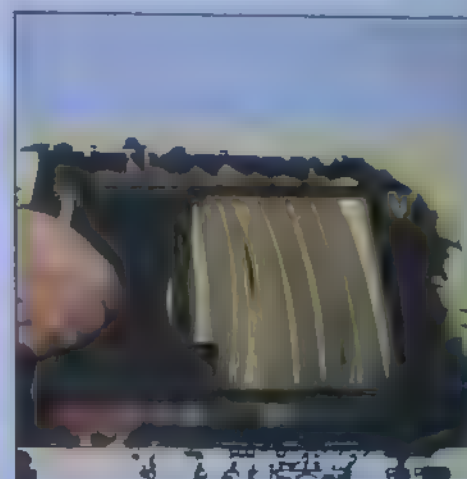
1 Image and Transfer material (INT) is exposed like Color-Key but exposure tests should be made first for each new pack of this more expensive material



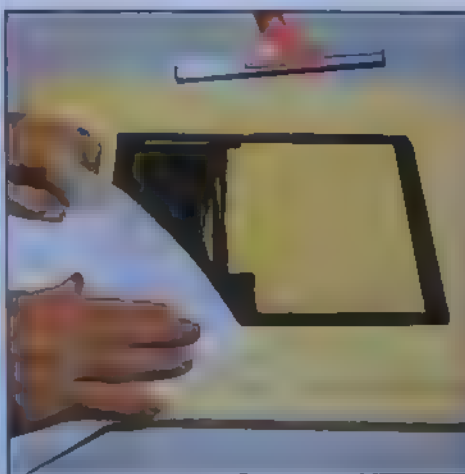
2 Expose a small strip of INT in contact with a step wedge. For processing, peel off the protective liner to reveal the peach coating and soak this in a pool of water



3 Leave the INT to soak for 10 to 15 seconds then wipe away the dissolved peach coating. Then spread on INT developer to reveal the test image



4 On the basis of your test, expose the main image and process as before. Let the developer set for 20 secs, then use both an up-and-down and side-to-side zigzag wipe



5 Rinse both sides of the sheet with cool water and lightly squeegee the uncoated side. Flip the film and then blot the coated side before leaving it to air dry



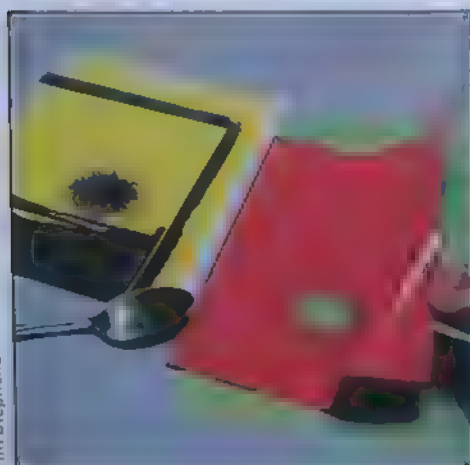
6 Store the finished sheet with the coated side in contact with the green sheet that is provided. Poor tack indicates that the exposure is either too short or too long



7 The INT dry transfers can be rubbed down on to almost any type of surface. You can build up coloured images but take care to get the order right



8 Use a blunt stylus or spoon and rub until the image appears to become slightly grey. As you slowly peel the carrier sheet away, check the image transfer



Tim Stephens

9 Interesting and colourful effects are possible by rubbing down INT transfers on to both sides of a transparent material such as acrylic sheet



Colour transfer Like Color-Key, INT gives a strongly coloured graphical quality to photo originals—but it can be rubbed on to almost any surface

Image and Transfer

A related product, Color-Key, is available from the same company. It is a dry transfer material that can be rubbed on to almost any surface. The resulting image is a high-contrast, black and white image. The transfer is made by rubbing the material onto the surface of the original image. The resulting image is a high-contrast, black and white image. The transfer is made by rubbing the material onto the surface of the original image.

INT material is available in a variety of colors and finishes. It can be rubbed on to almost any surface. The resulting image is a high-contrast, black and white image. The transfer is made by rubbing the material onto the surface of the original image.

To use INT, simply prepare a line negative from your original or make an intermediate orange-red negative by contact print a

sheet of INT material, exposing it exactly the same way as Color-Key.

After removing the protective sheet from the back of the INT material, expose the emulsion to light for 10 minutes. Place the sheet on a flat, light-colored tray, and gently wipe the front with a soft cloth. Rinse the material in water.

The sheet is subsequently placed on a dry, other sheet of dry transfer material, placed on a flat surface and rubbed down. Carefully peel away the backing sheet. The transfer is now ready to be used. Dry transfer material can be combined either with other transfers you have made, or with other transfers available ones. To prevent peeling, make sure the first image is not too thick, burnished and then use the 'pre-release' technique to add the second. Do this by holding the transfer sheet off the actual work surface while gently rubbing the transfer image to partly release it from the backing sheet. Then press the image into position, burnishing as you do so. Finally, apply special dry transfer lacquer or varnish to protect the dry transfer work from scratches.

What went wrong?

Patterns

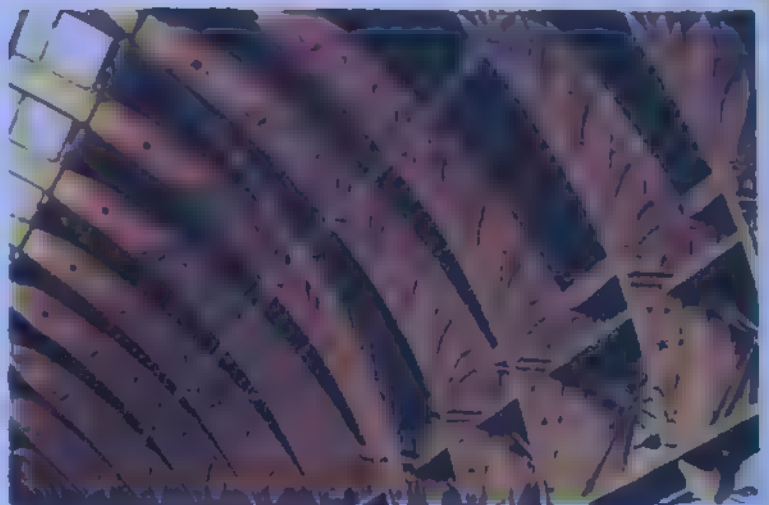
Patterns can make fascinating images but, as Ian McKinnell suggests, careless composition can rob them of all impact



The above photograph is a poor example of a pattern. It is a photograph of a blue umbrella with a repeating pattern of dark, curved lines. The pattern is not well defined, and the composition is poor. The umbrella is not centered, and the lines are not clearly visible. The photograph is a poor example of a pattern.

Buildings offer a good opportunity for searching out patterns, since the nature of their construction demands the constant repetition of basic forms such as windows, columns or roof girders as employed here. But such repetition needs to be handled with care or it will run the danger of becoming monotonous. This is a trap that this picture falls into. Nothing in the composition grabs the eye and prevents it from wandering out of the shot. Regularity such as this demands some kind of break, a focal point within the shot to hold the viewer's eye. There are many ways this shot could have been improved. The photographer could have used a longer lens, closing in on the interesting detail that can be seen on the girders. I would have concentrated on the bottom left hand corner where the pattern is most apparent, or else widened the shot and looked for some detail such as a signal to break up the rather monotonous regularity.

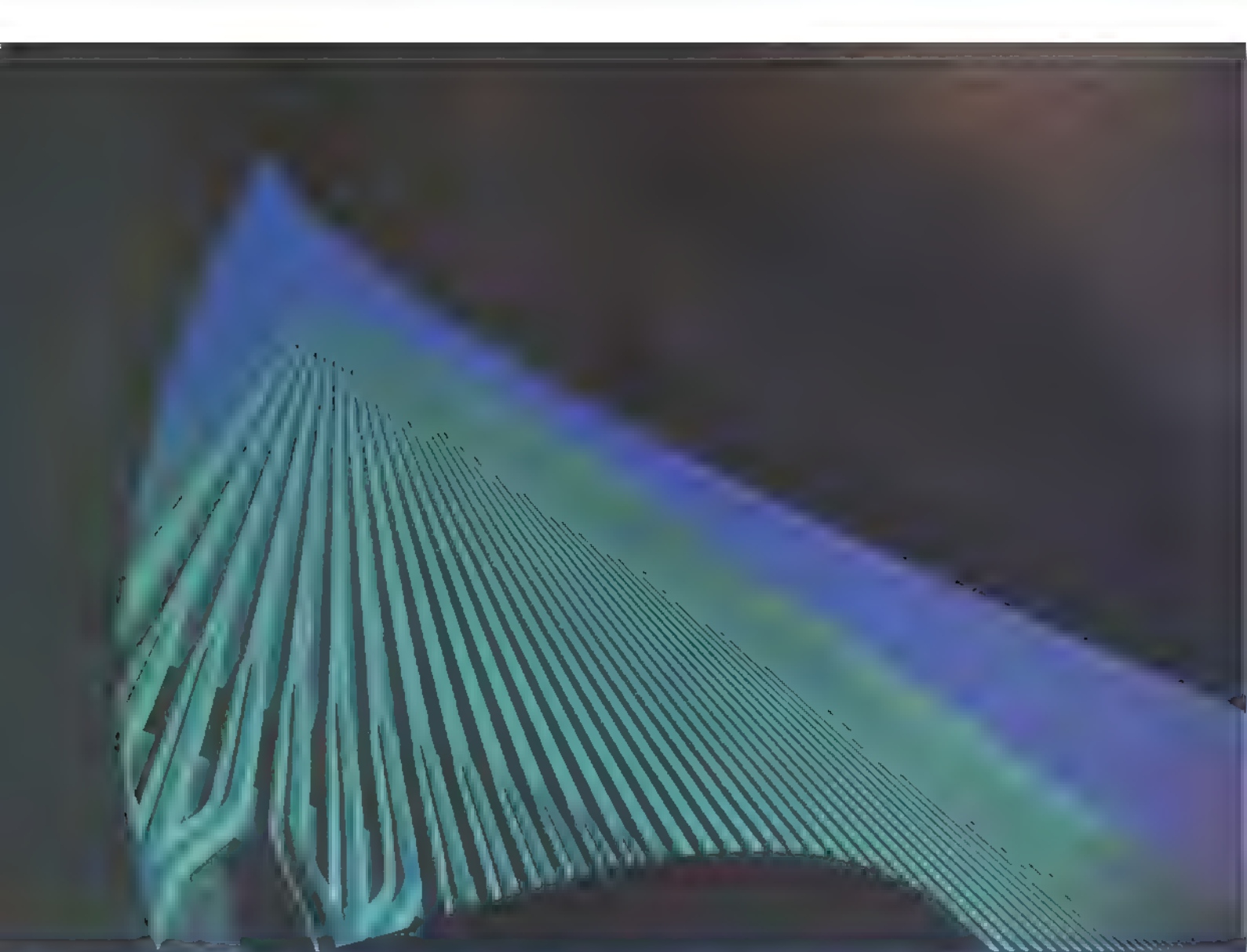
A monotonous pattern rarely makes an interesting shot in itself but it can provide the basic compositional framework which can be exploited by including some conflicting element. For example, a long line of red buses with one green one standing out or a vast array of uniform office block windows with a riotous collection of flowers in one



To an extent this shot illustrates the point made above, that breaks in a pattern are important, for the irregularities on the right of this image draw attention to the more perfectly shaped figure of the left side. But on the whole this is a very poor photo. It was taken in the same railway station as the shot above, but instead of searching out new patterns, the photographer has simply presented an existing pattern he has found. Thus although the photographer can claim some credit for having found the pattern and recorded it on film, the fact that it is a straight record shot of an existing pattern means that the real credit for the image should perhaps go to the original designer rather than the photographer.

For this shot the photographer used a 400 mm lens, the longest he had, so he cannot justly be criticized for not framing tighter. As the colour adds nothing—the shot is virtually monochrome now—perhaps the shot should have been taken in black and white. This would have offered two advantages. Firstly it would mean that the photographer could have experimented in the darkroom, cropping the shot in different ways to find a more interesting composition. Secondly he could have taken advantage of the contrast control available in b & w printing to either introduce more detail into the background.





Creative approach

MODERN BUILDINGS

Much of modern architecture appears on the surface bland and repetitive. Yet there are many exciting modern buildings, and even the less immediately attractive examples provide a challenging and fascinating subject for the creative photographer

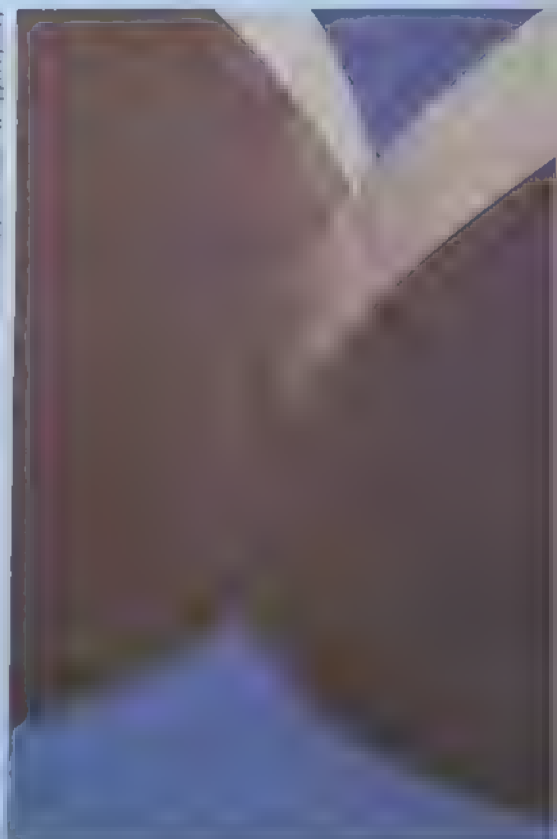
Modern buildings are everywhere. They are the new landmarks of our cities, the symbols of our progress and our power. They are the most exciting and challenging subjects for the creative photographer. Yet many of them are so bland and repetitive that they seem to blend into the background. How can you make a photograph of a modern building that is both visually appealing and also captures the essence of the building's design?

One of the most common mistakes made by photographers is to take a whole modern building or buildings taken from a distance will rarely result in interesting images. Few examples of

World Trade Centre *Framing the composition with a foreground object is all the more effective if, as here, its form echoes shapes in the main building.*
Curves *By selecting simple elements and framing tightly, you can make a very pleasing composition*

modern buildings are visually appealing enough to justify such an approach. Instead it is necessary to enliven the photo by various means. Shooting at dusk can produce interesting results, as can using a long exposure. Shots bear in mind the colour cast which

Rebecca Sussman



Top: M. Koster



These are the main problems of the composition. For example, the building is not clearly defined against the sky. The foreground structure is too large and dominates the scene. The building's windows are not clearly visible.

Another major problem is the lack of a clear focal point. The building is the main subject, but it is not clearly defined against the sky. The foreground structure is too large and dominates the scene.

Expanding our view to the right and left, we find that the building is not clearly defined against the sky. The foreground structure is too large and dominates the scene. The building's windows are not clearly visible.

The building is the main subject, but it is not clearly defined against the sky. The foreground structure is too large and dominates the scene. The building's windows are not clearly visible.

Another major problem is the lack of a clear focal point. The building is the main subject, but it is not clearly defined against the sky. The foreground structure is too large and dominates the scene.

Expanding our view to the right and left, we find that the building is not clearly defined against the sky. The foreground structure is too large and dominates the scene. The building's windows are not clearly visible.

The building is the main subject, but it is not clearly defined against the sky. The foreground structure is too large and dominates the scene. The building's windows are not clearly visible.

Another major problem is the lack of a clear focal point. The building is the main subject, but it is not clearly defined against the sky. The foreground structure is too large and dominates the scene.

Expanding our view to the right and left, we find that the building is not clearly defined against the sky. The foreground structure is too large and dominates the scene. The building's windows are not clearly visible.



Sculpture A foreground object can often help to bring out the strengths of the main subject. Here the triangular shape of the modern sculpture, with its strong colouring, heightens the surging energy of Paris Fiat in the background.

Reflection The strong, converging verticals of a building straight up the side of a tower can be impressive—especially with a wide angle—but an extra detail, such as this reflection, may lift the shot out of the ordinary.

Dallas To photograph a building with an interesting shape, you should try to find a combination of viewpoint and lens which allows you to exclude any extraneous distractions, keeping the number of elements down to the absolute minimum. This lets the building speak for itself.



Steven Goodman/Express

resulting from shooting from a strange angle can often be the main point of the picture. It is not always necessary to hold the camera either vertically or horizontally. Holding the camera at an angle generally produces a rather weird and unnatural effect but this may be precisely what you need for some photos.

Strong diagonal lines or lines sweeping from corner to corner give a dynamic effect and can look particularly effective when combined with tone or colour contrasts. Here wide angle lenses giving strange perspectives can be used particularly from very close to the building to give these strong lines. However, if you find that the wide angle makes precise framing difficult, switch back to the zoom.

If you look only at one building you may miss interesting contrasts and comparisons. Instead try creating interesting angles between two or more adjoining buildings or shooting the smaller building against the stark backdrop of its larger neighbour.

As they have little colour of their own, modern buildings respond well to strongly coloured filters. Try a red or magenta filter to create a glamorous modernistic effect (but only on cloudy, overcast days). Blue filters give a cool, hard effect. And there is now a full range of graduated filters to make a bland sky more exciting and hold in the composition. On bright sunny days a polarizing filter may be found to give the best results, darkening the sky to a richer tone. Polarizing filters however, also affect the reflections from windows and other reflecting surfaces such as perspex, so check the image in the viewfinder to ensure that the result you are getting is the one you want.

Reflections make bad enemies but

Dwarfed Juxtaposing old and new architecture emphasizes the contrast between the styles of two eras

Abstract The patterns made by stark shapes, bright colours and patches of dense shadow typical of modern buildings can make effective abstracts

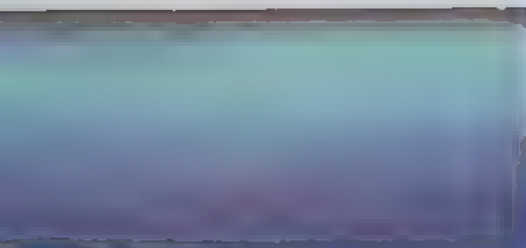
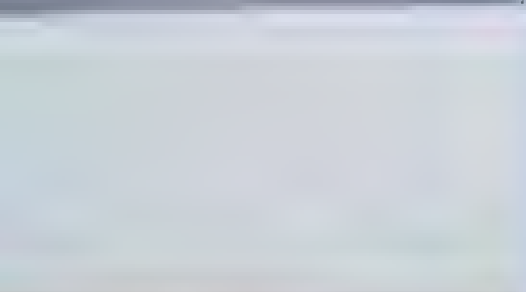
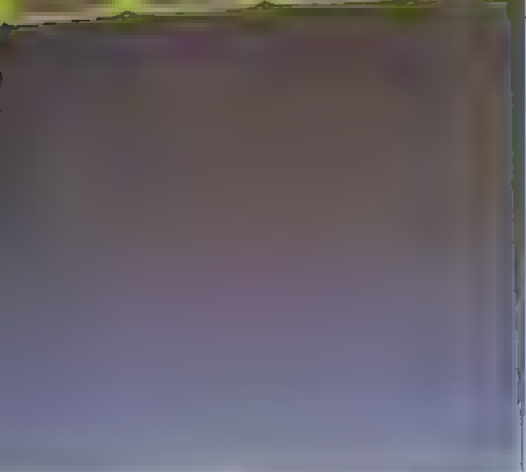
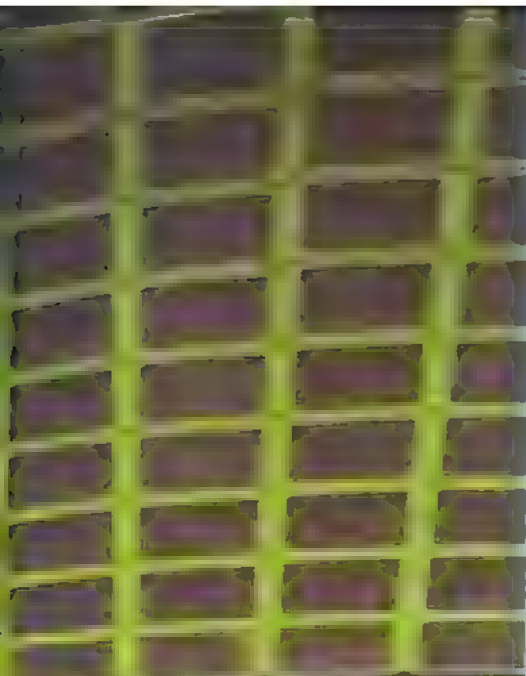
good friends. If you do, take them into account so you may find that they are merely an annoying distraction. On the other hand, using them creatively can add impact to an otherwise boring subject. Look for interesting reflections in individual windows or for a different perspective, move right back and use the building's entire expanse of glass. For example, try making an interior building some distance away and photographing an individual building in a way that, at sunset, its rise with the sun behind you. The glasswork will reflect the sun straight back if you make the building stand out against a dark sky.

A similar and even more dramatic effect results when a building is backlit, as is usually the case with a bright, thin, overcast or misty sky. There is a limit to how many such shots but you can increase your 'luck' by choosing your day carefully.

The lighting of the time you take your photographs will make a great difference to the final result, so timing is not just essential for good results. If you want a detailed overall shot of the whole of the building or a section, go at a time when the sky is fairly overcast, giving soft, diffused lighting. Alternatively, abstract photographs emphasizing the strong patterns and harsh lines of modern buildings will probably have more impact if shot in a bright sun when the contrast between bright highlight

and dark shadow will tend to out-line the pattern.

In addition the time of day should be carefully considered. Summer has blue skies more often than winter, but on a winter day the air is clearer and you can get a clearer result with fewer clouds. Winter will give more dramatic effects on any texture which appears in the picture. Some buildings are particularly beautiful because of the contrast between summer white walls and dark shadows and shapes. Other buildings are very recent and have a more uniform



light but keeping a building scorns fussy detail and depends on strong clean lines. In instance then an equally void simple approach is probably most suitable. But ultimately the choice is yours.



Dusk

The human element



COLOUR ENLARGERS

For quality colour printing correct colour balance is essential and the design of colour enlargers revolves around the filtration system, whether it is a simple colour drawer or a sophisticated mixing head

the negative is held in place by a clamp. The negative is then placed in the enlarger and the light is projected through it onto the paper. The paper is then developed in a developer solution.

After the negative has been developed, it is placed in a stop solution to stop the development process. The negative is then placed in a fixer solution to fix the image.

The negative is then washed in water to remove the fixer. The negative is then dried and the process is complete. The negative is then used to print the image onto a piece of paper.

Subtractive printing

The subtractive process is the most common method of colour printing. It involves the use of three primary colours (cyan, magenta and yellow) to create a full range of colours. The process is based on the principle of subtracting colours from white light.

The subtractive process is the most common method of colour printing. It involves the use of three primary colours (cyan, magenta and yellow) to create a full range of colours. The process is based on the principle of subtracting colours from white light.

Simple colour enlargers

Since colour printing became popular there have been a number of enlargers designed expressly with colour in mind. Some have developed an elegant



Paterson Products Ltd



Jon Buscher

simple design. The Paterson enlarger (left) is a simple design with a red base and a black head. The Philips enlarger (right) is a more sophisticated design with a black head and a black base. Both enlargers use a standard negative filtration system for subsequent negatives is fed in by altering the filter setting to give two null readings on a galvanometer.

With the aid of a colour

Drawers and heads

With the simplest colour enlarger, such as the Paterson (left), the filters are inserted manually into a colour drawer. With the more sophisticated colour head enlargers, the filtration is simply dialled in—often by remote control, as with the Philips (right).



The Kodak analyzer, for

the calibration of the negative and then in which it can for spot measurement.

Colour mixing heads

Diffusers and condensers

On-easel analyzing

light path between the source and the negative. The light source is a tungsten halogen lamp which gives good colour reproduction right to the end of the bulb.

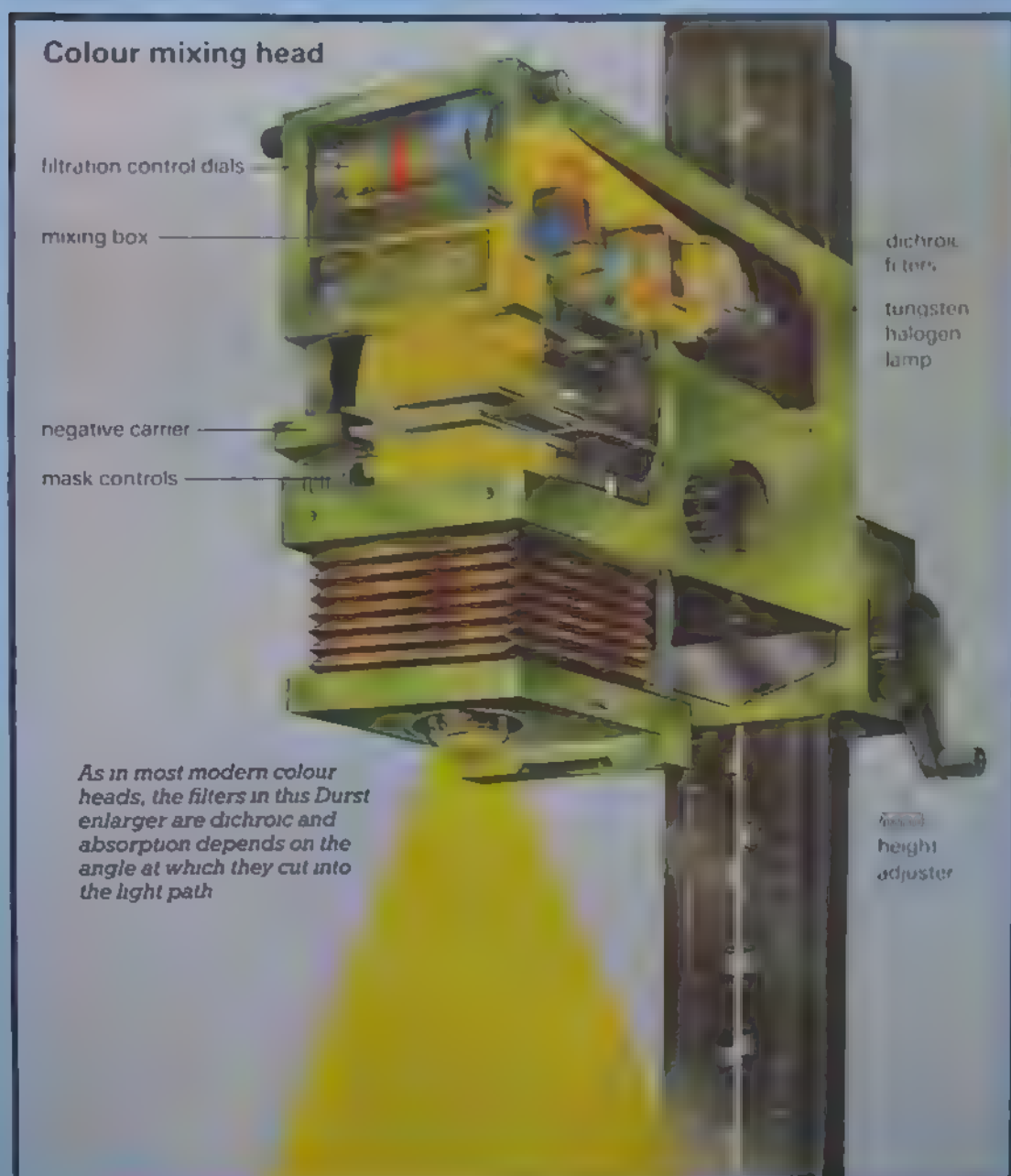
thing simple.

dichroic filters are used and from the light source. Dichroic filters are used to

control the light path and the range of the light source. They do not get hot like tungsten halogen lamps that work

Every manufacturer has a series of filter controls. For example, the control knobs from 0 to 100 but the numbers are arbitrary and are not the same as the numbers of Kodak CP filters which are based on the density in the region of maximum absorption. For instance, a Kodak CP30Y filter has a density of 0.30 to blue light. The Agfa-Gevaert colour printing foils have yet another numbering system and 100 on the Durst scale is equal to 200 on the Agfa-Gevaert, and the numbers of the latter are not related to their density.

Instead of a single light source, some colour heads use three separate, independently adjusted light



CAMERAS AT RISK

A yellow toy car with a large, dark, circular opening on its side, resembling a car with a large wheel or a car with a large hole, set against a dark, textured background.

Choosing the equipment

One way to avoid damage to equipment is not to use it. Instead, use cheap, expendable equipment. The cheapest — they can even be free — are 35 SLR cameras, 126 cameras or even VHS. The results may not be grand, and the range of conditions in which you can use them may be limited, but it is often possible to





David King (c) 2013 by David King, P. 101, 102, 103

At similar cost, you should be able to find good twin-lens sets. They will give you the quality advantage of the

Also worth considering is the little R 60; see page 174b. With its stainless steel body and built-in spring-driven motor drive it's a portable drive with cost-effective operation. Its strength is "any" like and although alternative lenses are hard to find, it's easy to make an adapter for the simple screw-in unit. Its drawbacks, which are minor for its low second-hand price, are its relatively limited speed at 11.25-14.4 cm/sec and the need to use film.

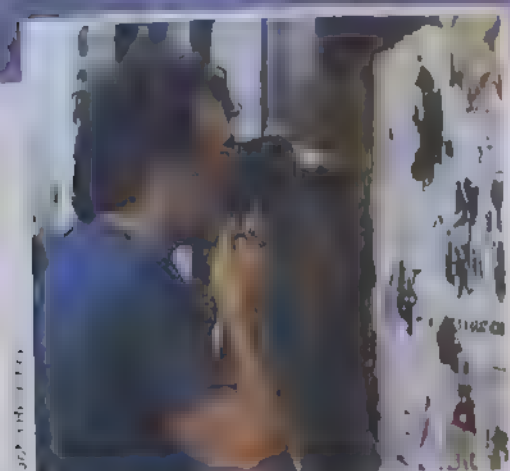
In the darkness the image pair must be separated from the background. This adds to the complexity of the task. November 1964, the remains of a conventional u-boat rubber seal, for example, made the housing gas tight.



CITY

close-ups

Close-up photography is often associated with natural history but New York photographer, Alan Porter shows that there is just as much scope for closing in on urban subjects



Alan Porter is a professional photographer who has been taking close-up photographs for many years. He is known for his work in urban environments, where he often finds subjects that are overlooked by the wider public. In this article, we will explore some of his most recent work, which shows that there is just as much scope for closing in on urban subjects as there is for natural history.

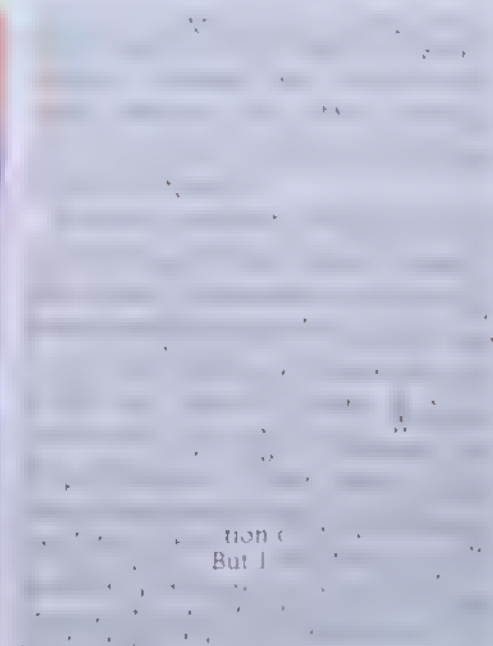
In order to provide a graphic illustration of this point, we asked New York photographer Alan Porter to take some close-up shots while walking

Wet leaf A shower of rain looked like running a day's photography but turned this oily mess into a glistening study for Alan's 55 mm Micro Nikkor lens. The tripod's lateral arm made it easier to point the camera straight down towards the ground. **Faded colour** Even faded paintwork and corrosion can make beautiful pictures in close-up—this is a panel on an old garbage truck that caught Alan's eye





Shop window A Also look at the shop window revealed a strong contrast between the bright red sign and the faded magazine cover, coming out of the black ground. The graphic effect was achieved by very careful framing. **Rope Arch** contrast in colour and texture of the rear of another track provided Alan with striking abstract. **Brick wall** The colours and shapes made a strong composition when isolated by the close focusing lens.



approach
This manipula-
looking for good bleets and back
grounds, and then combining them
unless, of course, Alan notices som-
thing that is fine just the way it is. Walking



DAVID BAILEY

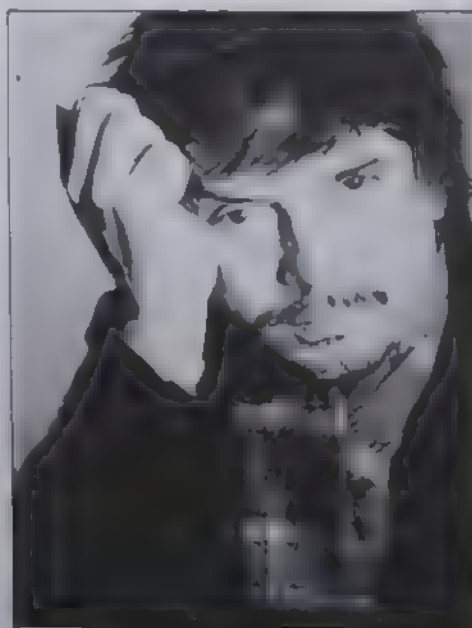
Since his meteoric rise to success in the 1960s, the British photographer David Bailey has established himself as one of the world's most creative and original photographers

When David Bailey first became known as a photographer, he was the most famous in the world. He was the first to take a picture of a person in a car, and he was the first to take a picture of a person in a car. He was the first to take a picture of a person in a car, and he was the first to take a picture of a person in a car. He was the first to take a picture of a person in a car, and he was the first to take a picture of a person in a car.

Even after 25 years, David Bailey is still the same. He is still the same person who painted a picture of a person in a car, and he is still the same person who painted a picture of a person in a car. He is still the same person who painted a picture of a person in a car, and he is still the same person who painted a picture of a person in a car. He is still the same person who painted a picture of a person in a car, and he is still the same person who painted a picture of a person in a car.

Nowadays, Bailey does very little of

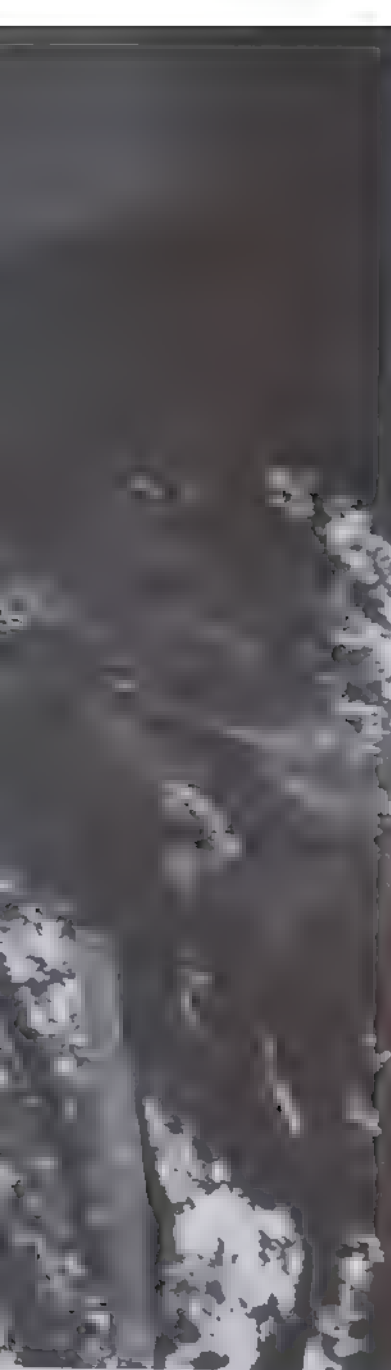
The photographer in a reflective mood, as portrayed by his assistant, John Swannell



the last 25 years. He has been busy with his other work, and he has been busy with his other work. He has been busy with his other work, and he has been busy with his other work. He has been busy with his other work, and he has been busy with his other work. He has been busy with his other work, and he has been busy with his other work.

He has been busy with his other work, and he has been busy with his other work. He has been busy with his other work, and he has been busy with his other work. He has been busy with his other work, and he has been busy with his other work.

He has been busy with his other work, and he has been busy with his other work. He has been busy with his other work, and he has been busy with his other work. He has been busy with his other work, and he has been busy with his other work. He has been busy with his other work, and he has been busy with his other work.



all ph. © 1971 by A. S. D. & J. D. & J. D.

Veiled lady The model, Marie Helvin, is also Bailey's wife and one of his favourite subjects. Here she was photographed on assignment for Yves St Laurent.

Wallpapered One of the curious set of images showing 'ways of wrapping women' that Bailey is collecting together for publication.

High-heeled sandal The eroticism of this image lies entirely in the idea behind the photograph and the suggestiveness of the pose. It was one of many celebratory pictures of his wife in Bailey's book 'Trouble and Strife' (Cockney rhyming slang for 'wife').





**Mick Jagger Taken
on Primrose Hill as
The Rolling Stones
Enter the City**



Jack Nicholson A personal portrait of an old friend taken in the studio on 5/12/82
Bailey enjoys taking portraits and has gained much of his fame through them



Joseph Losey
Double exposure
has been used to
great effect in this
portrait of the British
film director. Taken
for British 'Vogue' in
the late 1960s

Bailey does all the printing for his exhibitions and books, using Ilford Galerie and Agfa Record Rapid paper. But he uses an outside printer for his press work or when he doesn't have the time to print himself.

He uses a wide variety of film, although for most of his commercial assignments he will take mainly Ektachrome 64, with a back-up of some Ektachrome 200. For his black and white photography he used Ilford Pan F. 'But I wouldn't make rules about it. I use everything. I use FP4 a lot too, especially for my 5 x 4 work

Like most photographers, Cockney enjoys seeing his work reproduced in books and he has published a lot of them. They range from *Goodbye Baby and Amen*, his book documenting the famous faces of the 'Swinging Sixties' to a recent book of some 600 photographs titled *Love and Style*. Cockney slang for 'wife' featuring his wife, Marie Helvin

A more recent project is a book of nudes which is a photographic exploration of 'ways of wrapping women'. It was inspired by a Japanese book on wrapping objects, and is hardly

Ingredients that brought him th
the first place—a continuing ei

Improve your technique

FLASH by night

Using flash outdoors is very different from using it inside, and exposure can be quite tricky. Fortunately there are some simple techniques to help you solve these problems



Vautier/de Nanxé

Now that flash has become accepted as a tool for the better, taking pictures at night has become a lot easier. But there are still some problems that can arise when you're shooting in the dark. And even those who have mastered the technique of using flash at night can still find it difficult to get the best possible results.

The main problem with using flash at night is that the light from the flash is very bright and can cause the subjects to be overexposed. This is because the quality of light from a flash is quite different from what you normally see. Night scenes are often dominated by a number of weak light sources: streetlamps, light from doorways or windows or car headlamps. Once your eyes have become accustomed to the dark you can see these. But the light from a flash is much brighter and, usually harsher. Your camera sees only that and not the weaker available light.

Direct flash

The available light that you can see gives toplighting, sidelighting and back-

Carnival flash Here the background, hats and bright clothes have helped to outline the subjects

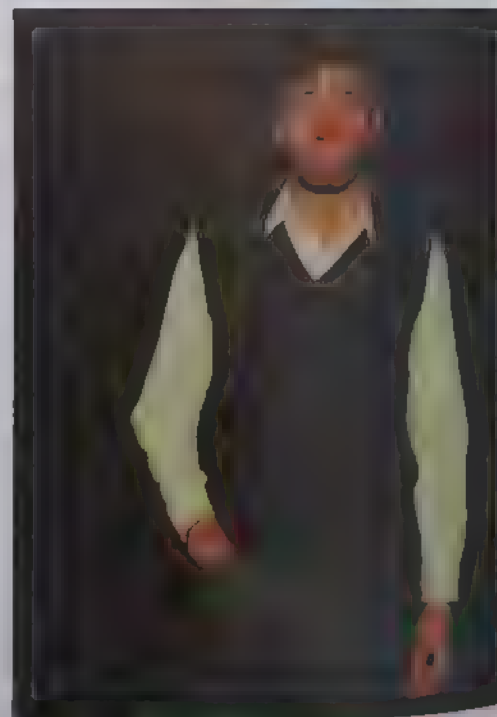
lighting. But the flash on your camera is very bright and can cause the subjects to be overexposed. This is because the light from a flash is much brighter and, usually harsher. Your camera sees only that and not the weaker available light.

The simplest way to overcome this is to put your subject against a nearby light background, so that any dark areas are outlined against a paler area rather than blackness. If you are out in a field even a bush or hedge will do, as long as your

subject is not too close to it. If you are in a field, you can use a bush or hedge as a background. If you are in a city, you can use a building or a wall as a background. If you are in a field, you can use a bush or hedge as a background. If you are in a city, you can use a building or a wall as a background. If you are in a field, you can use a bush or hedge as a background. If you are in a city, you can use a building or a wall as a background.

Flash is a very useful tool, but it can be tricky to use at night. The main problem is that the light from the flash is very bright and can cause the subjects to be overexposed. This is because the light from a flash is much brighter and, usually harsher. Your camera sees only that and not the weaker available light.

Faced with the problems of subject brightness and limited range it is tempting to use the



Disappearing trick Although exposure here is correct, the dark clothes and hair have merged into the background

sensor altogether and use it manually. This can also lead to problems, but usually the results are consistent though not perfect.

The guide number and the f/stop needed apertures are worked out for you, and you can see if the flash will be used.

For example, if you have a guide number of 100 and you are using a lens of f/8, you can see that the flash will be used at a distance of 12.5m (100 ÷ 8 = 12.5).

A camera with a flash can be used in a number of ways. It can be used in a number of ways, but the most common is to use it in a number of ways. The flash can be used in a number of ways, but the most common is to use it in a number of ways.

Using available light

Streets, indoors, by the windows and so on may not give enough light to take pictures by, but then they have to be picked up by the camera's internal light source. You stand in the extreme shadow of the subject and the camera is in the light. The flash will be used, but there may be a problem with the flash. The flash may be used, but there may be a problem with the flash. The flash may be used, but there may be a problem with the flash.

Just a few feet from the subject, the flash will be used. The flash will be used, but there may be a problem with the flash. The flash may be used, but there may be a problem with the flash.

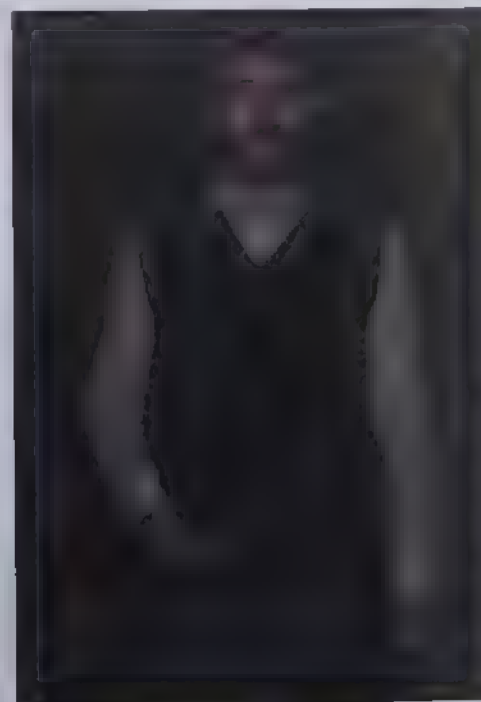
Flash off the camera

If you have a flash, you can use it in a number of ways. The flash can be used in a number of ways, but the most common is to use it in a number of ways. The flash can be used in a number of ways, but the most common is to use it in a number of ways.

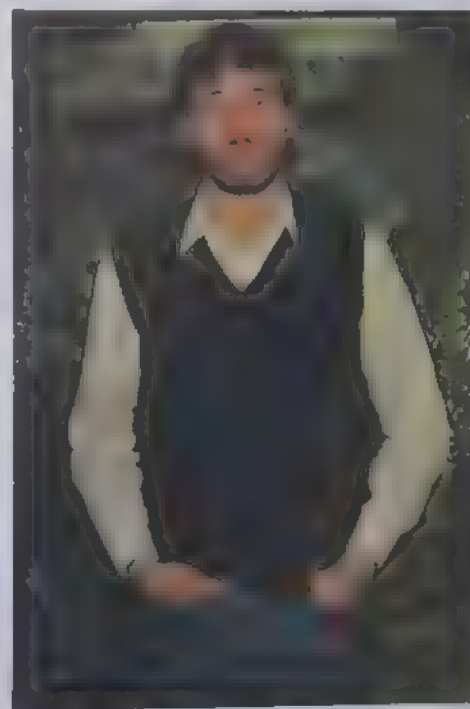
With the flash off, you can use it in a number of ways. The flash can be used in a number of ways, but the most common is to use it in a number of ways. The flash can be used in a number of ways, but the most common is to use it in a number of ways.

Plane sky Shooting at dawn or dusk gives you a sky which is just bright enough to outline the subject

Against the wall Although the background is underexposed, it still helps to give shape to the subject



Manual mode Using the guide number method results in underexposure due to the absence of reflecting surfaces



By using the flash, you can use it in a number of ways. The flash can be used in a number of ways, but the most common is to use it in a number of ways. The flash can be used in a number of ways, but the most common is to use it in a number of ways.

If you are very far away the illuminated area will be rather small in the frame but will be correctly exposed.

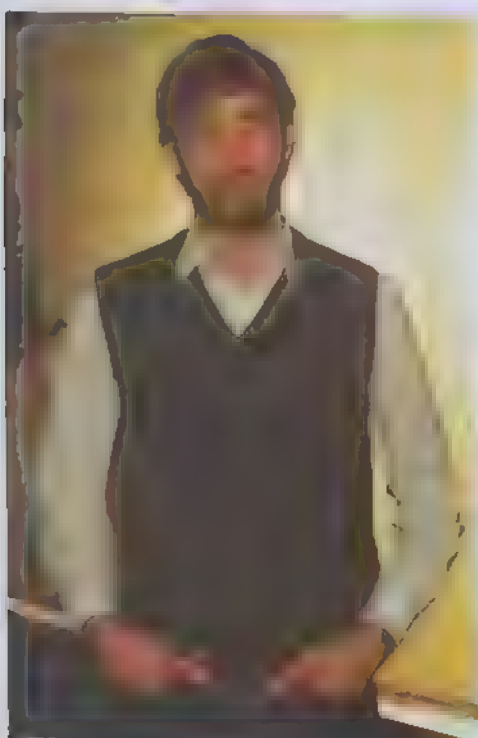
Bright face Giving one stop more exposure brings out the clothes and hair but overexposes the skin tones



Flash bike Having the flashguns separate to the camera enables the photographer to move around without changing exposure.

Inside light You can use available light to give a background if you set the flash on automatic.

Tree light This shot used two flash units – one at the portrait position and one behind the tree to give sidelighting.



Multi-flash

The multi-flash technique is a very useful one for the photographer. It allows you to use more than one flash unit to create a variety of lighting effects. This can be done by using a main flash unit and one or more slave flash units. The slave units can be triggered by the main unit or by a separate trigger. This allows you to create a variety of lighting effects, such as sidelighting, backlighting, and so on. The multi-flash technique is a very useful one for the photographer.

The multi-flash technique is a very useful one for the photographer. It allows you to use more than one flash unit to create a variety of lighting effects. This can be done by using a main flash unit and one or more slave flash units. The slave units can be triggered by the main unit or by a separate trigger. This allows you to create a variety of lighting effects, such as sidelighting, backlighting, and so on. The multi-flash technique is a very useful one for the photographer.



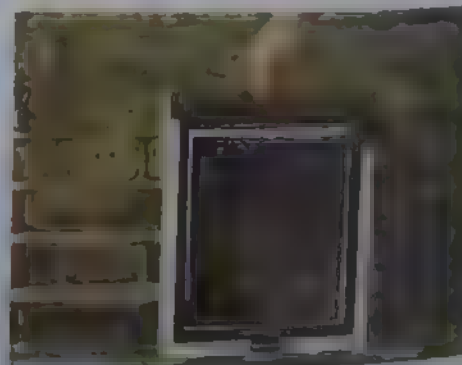
Painting with light



[illegible][illegible]

2 Mix the albumen, rectified spirit and sodium chloride solution, then whisk for 15 minutes before leaving to stand overnight

2 Mix the albumen, rectified spirit and sodium chloride solution, then whisk for 15 minutes before leaving to stand overnight



6 Float the dry albumen paper for three or four minutes in the silver nitrate solution then dry. Beware of scorching the emulsion if heat drying.



gives a white image on a blue

the earliest forerunner of modern photocopying. However, because there is no effective fixing process, the results tend to fade if exposed to bright light, and so there are few good examples of originals. A hard, negative was used to give the example on the right. Because there is very little tone range in a cyanotype, most of the whites are tinted blue by the process.



one 25 g of potassium permanganate

coated on to glass

Manganese lactate printing



1 Dissolve 5.7 grams of potassium permanganate in 50 ml water and stand in a large container of cold water. A jug will do for this.



2 Add the lactic acid, a drop at a time, to the potassium permanganate solution down a glass rod and mix thoroughly before adding the next drop.



3 Great heat is generated when the lactic acid is added and the solution bubbles strongly. A fume mask may be necessary for this step. Alternatively, work outdoors.



7 Coat the paper smoothly and evenly under subdued lighting with a soft brush. Gloves should be worn during this step to avoid staining your hands.



8 Next, leave the paper to stand for half a minute, and then blot to remove the excess. The paper should be left to dry in the dark.



9 Expose the paper for between four and 15 minutes in direct sunlight using a black and white transparency prepared from the original negative.

dissolving 43 g sodium chloride (common salt) in 50 ml distilled water with 6 ml rectified spirit (ethyl alcohol). Then add 170 ml pure albumen. You obtain albumen very easily from the greatest part of egg white at a cost on average around 1 franc.

hens to render their egg graphic use an individual preventing contamination mix in the event of one broken. Remove the germ of the well.

Whisk the albumen spirit solution for 15 minutes hours. When this has been clean cotton wool in a dish then filter the beaten albumen through it. No more than 10 ml in to a flat-bottomed dish will do. Float the paper on the top.

of the paper come in. Carefully lift it away after and wet any dry patches with hair brush. Return the dish for about a minute and then set it aside for

4. Wash in the other half tray of paper.

Manganese lactate This process gives fairly permanent results in different colours, which occurs depending on the developer.



4 The glucose solution is prepared by dissolving four grams of glucose in 15 ml of hot water. Leave this to cool then filter through cotton wool.



5 Mix the glucose solution with the manganese lactate solution, in a well-aired room under subdued lighting as the mixture is sensitive to light.



6 If the manganese lactate solution is too gritty then it may be necessary to give it an extra filtration through cotton wool or muslin.



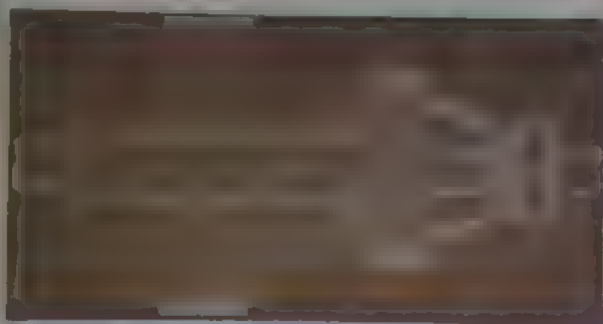
10 During exposure, examine the image after, say, ten minutes. If all is going well a thin negative appearance will be seen as well as the heavier positive.



11 Develop in a saturated solution of aniline sulphate which gives a green image. For a violet image, add ammonia. Use these two solutions with care.



12 Development takes about 30 seconds after which you should wash the print for five minutes in running water and then dry it.



VAN DYKE 'BROWN PRINT'

The Van Dyke 'brown print' is a process which gives a warm brown colour. It is based on the use of a combination of iron and silver salts (but consider the cost of the latter). The Van Dyke process can only be used to produce a limited range of tones in either a brown-black or warm brown colour, depending on the sensitizer formula used (see panel). This should be prepared using a fairly coarse-textured paper—or even fabric—for the support, which must be coated in safelight. After



The Kallitype process is a process which gives a brown-black colour. It is based on the use of a combination of iron and silver salts (but consider the cost of the latter). The Kallitype process can only be used to produce a limited range of tones in either a brown-black or warm brown colour, depending on the sensitizer formula used (see panel). This should be prepared using a fairly coarse-textured paper—or even fabric—for the support, which must be coated in safelight. After

courtesy of the Kodak Museum

wash steps and your print is complete. To add real period character you may like to gold tone your prints (see pages 1922 to 1924). This also improves long term permanence.

Another variation is to double albumenize the paper before sensitizing it. This will give you a semi-matt, stippled finish instead of comparatively glossy finish normally obtained. The first coating uses an emulsion obtained by beating a mixture of 170 ml albumen with 20 ml rectified spirit and 40 ml distilled water and coating it on the paper by the floating method. Leave it to dry and then hold it over the spout of a steaming kettle. This coagulates the albumen, which clumps together to form a stippled emulsion. Let the paper dry and then give a second coat using the normal salted albumen emulsion.

Old salt processes

A cyanotype (c. 1842) is often called a *blueprint* because of the white image on a blue background which is obtained using the process. It is one of the simplest, quickest and cheapest methods of recording a line original. From an early date, it found favour in engineering and architecture for copies of drawings and plans. The process only works well with very bold, contrasty originals. The cyanotype is an *autonegative* process which gives a positive from a negative and is a member of the vast iron salt family of processes which includes platinum and Pellet's process (an *autopositive* version of blue printing). Many of these iron salt processes can be used for printing on a wide variety of papers and on fabrics ranging from cotton to canvas.

To make a blueprint you coat your

paper with mixtures of potassium ferricyanide and ammonium citrate (see panel). It is dry naturally. The dry paper is then exposed in contact with a contrasty negative. As with all these processes relying on contact printing, exposures should be made with a UV lamp, or in bright sunlight. Exposed areas of the cyanotype turn bright blue. No development is needed but several washes are needed to remove the yellow-orange or greenish-yellow emulsion areas that have not been exposed, leaving white or the base colour. The last wash must be slightly acidified with a few drops of hydrochloric acid to act as a 'fixer' bath which also improves the image's 'v. v. v.'.

Pellet's process (c. 1880) involves coating the paper with simple solutions of gum arabic, ferric ammonium citrate and ferric chloride. When exposed in contact with a transparency, it gives a positive yellow image which turns blue on 'development' in a solution of potassium ferrocyanide. This is a potentially dangerous chemical which must be handled and stored with extreme caution, so the process is not one for casual experiment—and should be used only if you know precisely what to do.

The Van Dyke 'brown print' and Kallitype processes are based on the use of a combination of iron and silver salts (but consider the cost of the latter). The Van Dyke process can only be used to produce a limited range of tones in either a brown-black or warm brown colour, depending on the sensitizer formula used (see panel). This should be prepared using a fairly coarse-textured paper—or even fabric—for the support, which must be coated in safelight. After

exposure, using contact printing methods and UV light source, the image is developed either by washing the print or by immersing it in a weak borax solution. A simple fixer bath and wash then follows.

The Kallitype offers a choice of three image colours, depending on which developer you use. The sensitizer contains a large amount of expensive silver nitrate (see panel). Mix and apply this in safelight conditions on paper or fabric which has been sized and dried. It is best to use bold, contrasty negatives.

Development is in solutions of borax, Rochelles salts (sodium potassium tartrate) and potassium dichromate. Fixing is in plain sodium thiosulphate made alkaline with a small quantity of ammonia (see panel).

Palladium printing is an iron salt process and is almost identical to platinum printing (pages 2360 to 2363) except that the platinum solution in the formula (solution B) is replaced by a solution consisting of 5.2 g potassium chloropalladate dissolved in 25 ml distilled water. Prints for the palladium process need slightly more exposure than given for platinum.

When development is complete, rinse the print in a very weak (half percent) bath of hydrochloric acid and tap water. Leave the print in this for about five minutes and then pass it through two successive baths of the same strength, for the same duration. Then wash the print thoroughly before leaving it to dry.

The palladium process does not offer quite the same degree of contrast control (obtained by adjusting the ratio of the three solutions used in platinum printing) so it is best to stick to the normal ratio.

What went wrong?

Mountain scenery

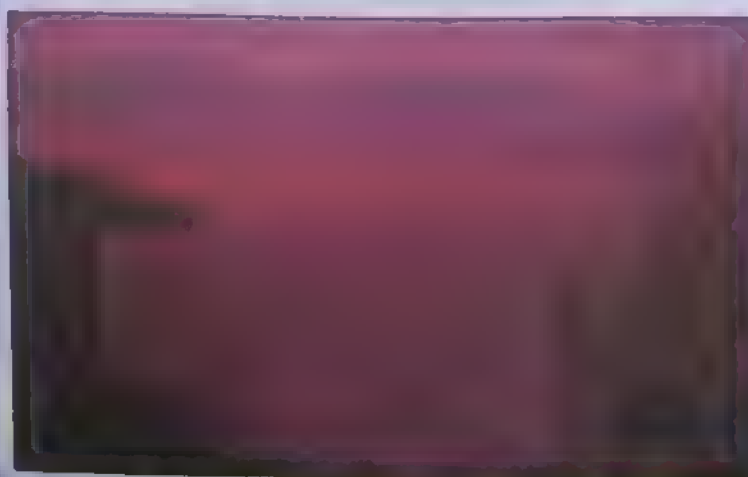


Problems of scale, contrast and weather conditions make mountains and mountain scenery difficult to photograph well. The subject here looks promising, but this shot, taken with a high sun and from eye level, lacks interest. There are no dynamic lines or points of focus, and the colours are rather weak. I would suggest waiting for the sun to sink much lower in the sky, even slightly below the horizon, to allow the face of the cliff to stand in relief, and then to lower the position of the camera to the level of the rocks in the foreground.

Problems of scale, contrast and weather conditions make mountains and mountain scenery difficult to photograph well. The subject here looks promising, but this shot, taken with a high sun and from eye level, lacks interest. There are no dynamic lines or points of focus, and the colours are rather weak. I would suggest waiting for the sun to sink much lower in the sky, even slightly below the horizon, to allow the face of the cliff to stand in relief, and then to lower the position of the camera to the level of the rocks in the foreground.



Of the three examples, this for me provides the greatest number of compositional possibilities in terms of both the camera position and the camera/lens combination. My main concern would be to accomplish as much as possible before the light disappears totally. Initially I would concentrate on the left-hand side of the picture, eliminating as much of the leafless tree as possible and emphasizing the silhouette of the hut against the distant peaks. The dark zone, created by the outline of the hut, helps to strengthen the pink and mauve colours of the late evening sky. Since the framing is so important I would use an 80-200 zoom to eliminate the need to change lenses and waste time. With this same lens, or a longer focal length if available, I would then concentrate on the subtle tonal relationships between the peaks and the sky without any reference to the foreground. Finally, I would return to a similar framing to that in the example. Clearly, in all of these situations, the camera should be mounted on a firm tripod since most of the exposures will be under 1/125 second. In nearly all cases I advise bracketing the exposure by at least one stop either way and also, whenever the foreground is included in the shot, I would stop the lens down to ensure that all the elements in the picture are as sharp as possible.







FAST FILM at NIGHT

Colour photography after dark usually means flash. But Chris Steele-Perkins tried to get more natural results when photographing a fairground by using fast colour film, 3M's 640T

Chris Steele-Perkins is a well-known photographer who has worked in many different genres. He has been a street photographer, a documentary photographer, and a portrait photographer. He has also been a photojournalist and a photo editor. He has worked for many different publications, including the New York Times, the Washington Post, and the London Times. He has also been a member of the Magnum Photos agency. He is known for his bold and expressive style, and for his ability to capture the essence of a subject in a single frame. He has won many awards for his work, and his photographs are in the collections of many major museums.

A fairground is a place of many different things. It is a place of excitement and of wonder. It is a place where people come to have fun and to escape from the ordinary. It is a place where the lights are bright and the sounds are loud. It is a place where the night is not dark, but full of life and of colour.

Reflections The film has given good rich colours in the reflections of the street lights offset nicely by the clean white of the tubes. Grain, though large, is not too distracting

Photographer The low contrast of 640T characteristic of high speed transparency films, has given a soft image in keeping with the subject. Flesh tones are reasonably good despite the difficult lighting

Chris Steele-Perkins Magnum





Shoe shop

The shoe shop is a small, cluttered space with various styles of shoes on display. The lighting is somewhat dim, and the overall atmosphere is one of a traditional, perhaps slightly old-fashioned, retail environment.



Fellow travellers Chris took this little portrait of a fellow traveller from a fast world, but it was needed to join a group exposure despite the train's movement. But that would have turned a pleasant modelled portrait into an unattractive one.

Kiss Chris was amused by the way the smiling statue appeared to be watching the lovers. Although the shot appears to have an orange cast, this is due to the coloured foreground bulbs. White bulbs in the background are accurately registered.



Theater

...theater ...
...theater ...
...theater ...
...theater ...



Gamblers A single bright light in dark surroundings gives very high contrast—a difficult situation for any film—but 640T has performed commendably. Good detail has been retained in the poorly illuminated faces while the players' hands have not burned out. Use of flash would have destroyed the intimate atmosphere which gives the shot much of its appeal.

Faces Pushing the film to 1280 ASA (below) has given a marginal increase in depth of field. Although grain size has increased slightly the overall effect is virtually indistinguishable from the standard rating (right).



Improve your technique



Robyn Beeche

PHOTO MAKE-UP

Knowledge of make-up techniques is a useful asset for many types of photography—from fashion to portrait. Here are some tips and guidelines to show you what make-up can do

In fashion and beauty photography make-up plays a vital role. It is not something that can be left to chance or the whim of the model. It has to be considered as part of the overall artistic effect of the photograph. Good make-up can make all the difference between success and failure with this type of shot.

If you get a friend to do the make-up you must brief them. They will need to know not just what effect you are trying to create, but also whether the shot is a close-up cropped at the waist or full length. All this determines how the make-up is applied.

For a beauty shot, a model with good skin is preferable. But a covering foundation, strong colours and over-exposure can work wonders. However, if a very natural look is required and the shots are going to be taken outside, smooth skin with no lumps and bumps is essential.

Always ask the model to arrive with

The toolkit For greatest flexibility you should have a wide range of make-up and accessories, such as brushes

All photographs by Wayne Gunther



Painted face Make-up is a vital and versatile part of beauty photography, and is often used to create stunning images

be in with it if
it's a

mirror in

on three side

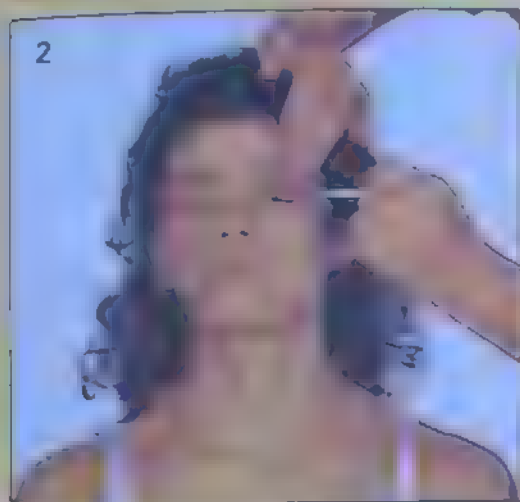
light, but with col

bulbs—specially made to match the
light, but with col

and ordinary pearl

for a change

the 1970s, the 1980s, the 1990s, the 2000s, the 2010s, the 2020s, the 2030s, the 2040s, the 2050s, the 2060s, the 2070s, the 2080s, the 2090s, the 2100s, the 2110s, the 2120s, the 2130s, the 2140s, the 2150s, the 2160s, the 2170s, the 2180s, the 2190s, the 2200s, the 2210s, the 2220s, the 2230s, the 2240s, the 2250s, the 2260s, the 2270s, the 2280s, the 2290s, the 2300s, the 2310s, the 2320s, the 2330s, the 2340s, the 2350s, the 2360s, the 2370s, the 2380s, the 2390s, the 2400s, the 2410s, the 2420s, the 2430s, the 2440s, the 2450s, the 2460s, the 2470s, the 2480s, the 2490s, the 2500s, the 2510s, the 2520s, the 2530s, the 2540s, the 2550s, the 2560s, the 2570s, the 2580s, the 2590s, the 2600s, the 2610s, the 2620s, the 2630s, the 2640s, the 2650s, the 2660s, the 2670s, the 2680s, the 2690s, the 2700s, the 2710s, the 2720s, the 2730s, the 2740s, the 2750s, the 2760s, the 2770s, the 2780s, the 2790s, the 2800s, the 2810s, the 2820s, the 2830s, the 2840s, the 2850s, the 2860s, the 2870s, the 2880s, the 2890s, the 2900s, the 2910s, the 2920s, the 2930s, the 2940s, the 2950s, the 2960s, the 2970s, the 2980s, the 2990s, the 3000s, the 3010s, the 3020s, the 3030s, the 3040s, the 3050s, the 3060s, the 3070s, the 3080s, the 3090s, the 3100s, the 3110s, the 3120s, the 3130s, the 3140s, the 3150s, the 3160s, the 3170s, the 3180s, the 3190s, the 3200s, the 3210s, the 3220s, the 3230s, the 3240s, the 3250s, the 3260s, the 3270s, the 3280s, the 3290s, the 3300s, the 3310s, the 3320s, the 3330s, the 3340s, the 3350s, the 3360s, the 3370s, the 3380s, the 3390s, the 3400s, the 3410s, the 3420s, the 3430s, the 3440s, the 3450s, the 3460s, the 3470s, the 3480s, the 3490s, the 3500s, the 3510s, the 3520s, the 3530s, the 3540s, the 3550s, the 3560s, the 3570s, the 3580s, the 3590s, the 3600s, the 3610s, the 3620s, the 3630s, the 3640s, the 3650s, the 3660s, the 3670s, the 3680s, the 3690s, the 3700s, the 3710s, the 3720s, the 3730s, the 3740s, the 3750s, the 3760s, the 3770s, the 3780s, the 3790s, the 3800s, the 3810s, the 3820s, the 3830s, the 3840s, the 3850s, the 3860s, the 3870s, the 3880s, the 3890s, the 3900s, the 3910s, the 3920s, the 3930s, the 3940s, the 3950s, the 3960s, the 3970s, the 3980s, the 3990s, the 4000s, the 4010s, the 4020s, the 4030s, the 4040s, the 4050s, the 4060s, the 4070s, the 4080s, the 4090s, the 4100s, the 4110s, the 4120s, the 4130s, the 4140s, the 4150s, the 4160s, the 4170s, the 4180s, the 4190s, the 4200s, the 4210s, the 4220s, the 4230s, the 4240s, the 4250s, the 4260s, the 4270s, the 4280s, the 4290s, the 4300s, the 4310s, the 4320s, the 4330s, the 4340s, the 4350s, the 4360s, the 4370s, the 4380s, the 4390s, the 4400s, the 4410s, the 4420s, the 4430s, the 4440s, the 4450s, the 4460s, the 4470s, the 4480s, the 4490s, the 4500s, the 4510s, the 4520s, the 4530s, the 4540s, the 4550s, the 4560s, the 4570s, the 4580s, the 4590s, the 4600s, the 4610s, the 4620s, the 4630s, the 4640s, the 4650s, the 4660s, the 4670s, the 4680s, the 4690s, the 4700s, the 4710s, the 4720s, the 4730s, the 4740s, the 4750s, the 4760s, the 4770s, the 4780s, the 4790s, the 4800s, the 4810s, the 4820s, the 4830s, the 4840s, the 4850s, the 4860s, the 4870s, the 4880s, the 4890s, the 4900s, the 4910s, the 4920s, the 4930s, the 4940s, the 4950s, the 4960s, the 4970s, the 4980s, the 4990s, the 5000s, the 5010s, the 5020s, the 5030s, the 5040s, the 5050s, the 5060s, the 5070s, the 5080s, the 5090s, the 5100s, the 5110s, the 5120s, the 5130s, the 5140s, the 5150s, the 5160s, the 5170s, the 5180s, the 5190s, the 5200s, the 5210s, the 5220s, the 5230s, the 5240s, the 5250s, the 5260s, the 5270s, the 5280s, the 5290s, the 5300s, the 5310s, the 5320s, the 5330s, the 5340s, the 5350s, the 5360s, the 5370s, the 5380s, the 5390s, the 5400s, the 5410s, the 5420s, the 5430s, the 5440s, the 5450s, the 5460s, the 5470s, the 5480s, the 5490s, the 5500s, the 5510s, the 5520s, the 5530s, the 5540s, the 5550s, the 5560s, the 5570s, the 5580s, the 5590s, the 5600s, the 5610s, the 5620s, the 5630s, the 5640s, the 5650s, the 5660s, the 5670s, the 5680s, the 5690s, the 5700s, the 5710s, the 5720s, the 5730s, the 5740s, the 5750s, the 5760s, the 5770s, the 5780s, the 5790s, the 5800s, the 5810s, the 5820s, the 5830s, the 5840s, the 5850s, the 5860s, the 5870s, the 5880s, the 5890s, the 5900s, the 5910s, the 5920s, the 5930s, the 5940s, the 5950s, the 5960s, the 5970s, the 5980s, the 5990s, the 6000s, the 6010s, the 6020s, the 6030s, the 6040s, the 6050s, the 6060s, the 6070s, the 6080s, the 6090s, the 6100s, the 6110s, the 6120s, the 6130s, the 6140s, the 6150s, the 6160s, the 6170s, the 6180s, the 6190s, the 6200s, the 6210s, the 6220s, the 6230s, the 6240s, the 6250s, the 6260s, the 6270s, the 6280s, the 6290s, the 6300s, the 6310s, the 6320s, the 6330s, the 6340s, the 6350s, the 6360s, the 6370s, the 6380s, the 6390s, the 6400s, the 6410s, the 6420s, the 6430s, the 6440s, the 6450s, the 6460s, the 6470s, the 6480s, the 6490s, the 6500s, the 6510s, the 6520s, the 6530s, the 6540s, the 6550s, the 6560s, the 6570s, the 6580s, the 6590s, the 6600s, the 6610s, the 6620s, the 6630s, the 6640s, the 6650s, the 6660s, the 6670s, the 6680s, the 6690s, the 6700s, the 6710s, the 6720s, the 6730s, the 6740s, the 6750s, the 6760s, the 6770s, the 6780s, the 6790s, the 6800s, the 6810s, the 6820s, the 6830s, the 6840s, the 6850s, the 6860s, the 6870s, the 6880s, the 6890s, the 6900s, the 6910s, the 6920s, the 6930s, the 6940s, the 6950s, the 6960s, the 6970s, the 6980s, the 6990s, the 7000s, the 7010s, the 7020s, the 7030s, the 7040s, the 7050s, the 7060s, the 7070s, the 7080s, the 7090s, the 7100s, the 7110s, the 7120s, the 7130s, the 7140s, the 7150s, the 7160s, the 7170s, the 7180s, the 7190s, the 7200s, the 7210s, the 7220s, the 7230s, the 7240s, the 7250s, the 7260s, the 7270s, the 7280s, the 7290s, the 7300s, the 7310s, the 7320s, the 7330s, the 7340s, the 7350s, the 7360s, the 7370s, the 7380s, the 7390s, the 7400s, the 7410s, the 7420s, the 7430s, the 7440s, the 7450s, the 7460s, the 7470s, the 7480s, the 7490s, the 7500s, the 7510s, the 7520s, the 7530s, the 7540s, the 7550s, the 7560s, the 7570s, the 7580s, the 7590s, the 7600s, the 7610s, the 7620s, the 7630s, the 7640s, the 7650s, the 7660s, the 7670s, the 7680s, the 7690s, the 7700s, the 7710s, the 7720s, the 7730s, the 7740s, the 7750s, the 7760s, the 7770s, the 7780s, the 7790s, the 7800s, the 7810s, the 7820s, the 7830s, the 7840s, the 7850s, the 7860s, the 7870s, the 7880s, the 7890s, the 7900s, the 7910s, the 7920s, the 7930s, the 7940s, the 7950s, the 7960s, the 7970s, the 7980s, the 7990s, the 8000s, the 8010s, the 8020s, the 8030s, the 8040s, the 8050s, the 8060s, the 8070s, the 8080s, the 8090s, the 8100s, the 8110s, the 8120s, the 8130s, the 8140s, the 8150s, the 8160s, the 8170s, the 8180s, the 8190s, the 8200s, the 8210s, the 8220s, the 8230s, the 8240s, the 8250s, the 8260s, the 8270s, the 8280s, the 8290s, the 8300s, the 8310s, the 8320s, the 8330s, the 8340s, the 8350s, the 8360s, the 8370s, the 8380s, the 8390s, the 8400s, the 8410s, the 8420s, the 8430s, the 8440s, the 8450s, the 8460s, the 8470s, the 8480s, the 8490s, the 8500s, the 8510s, the 8520s, the 8530s, the 8540s, the 8550s, the 8560s, the 8570s, the 8580s, the 8590s, the 8600s, the 8610s, the 8620s, the 8630s, the 8640s, the 8650s, the 8660s, the 8670s, the 8680s, the 8690s, the 8700s, the 8710s, the 8720s, the 8730s, the 8740s, the 8750s, the 8760s, the 8770s, the 8780s, the 8790s, the 8800s, the 8810s, the 8820s, the 8830s, the 8840s, the 8850s, the 8860s, the 8870s, the 8880s, the 8890s, the 8900s, the 8910s, the 8920s, the 8930s, the 8940s, the 8950s, the 8960s, the 8970s, the 8980s, the 8990s, the 9000s, the 9010s, the 9020s, the 9030s, the 9040s, the 9050s, the 9060s, the 9070s, the 9080s, the 9090s, the 9100s, the 9110s, the 9120s, the 9130s, the 9140s, the 9150s, the 9160s, the 9170s, the 9180s, the 9190s, the 9200s, the 9210s, the 9220s, the 9230s, the 9240s, the 9250s, the 9260s, the 9270s, the 9280s, the 9290s, the 9300s, the 9310s, the 9320s, the 9330s, the 9340s, the 9350s, the 9360s, the 9370s, the 9380s, the 9390s, the 9400s, the 9410s, the 9420s, the 9430s, the 9440s, the 9450s, the 9460s, the 9470s, the 9480s, the 9490s, the 9500s, the 9510s, the 9520s, the 9530s, the 9540s, the 9550s, the 9560s, the 9570s, the 9580s, the 9590s, the 9600s, the 9610s, the 9620s, the 9630s, the 9640s, the 9650s, the 9660s, the 9670s, the 9680s, the 9690s, the 9700s, the 9710s, the 9720s, the 9730s, the 9740s, the 9750s, the 9760s, the 9770s, the 9780s, the 9790s, the 9800s, the 9810s, the 9820s, the 9830s, the 9840s, the 9850s, the 9860s, the 9870s, the 9880s, the 9890s, the 9900s, the 9910s, the 9920s, the 9930s, the 9940s, the 9950s, the 9960s, the 9970s, the 9980s, the 9990s, the 10000s, the 10010s, the 10020s, the 10030s, the 10040s, the 10050s, the 10060s, the 10070s, the 10080s, the 10090s, the 10100s, the 10110s, the 10120s, the 10130s, the 10140s, the 10150s, the 10160s, the 10170s, the 10180s, the 10190s, the 10200s, the 10210s, the 10220s, the 10230s, the 10240s, the 10250s, the 10260s, the 10270s, the 10280s, the 10290s, the 10300s, the 10310s, the 10320s, the 10330s, the 10340s, the 10350s, the 10360s, the 10370s, the 10380s, the 10390s, the 10400s, the 10410s, the 10420s, the 10430s, the 10440s, the 10450s, the 10460s, the 10470s, the 10480s, the 10490s, the 10500s, the 10510s, the 10520s, the 10530s, the 10540s, the 10550s, the 10560s, the 10570s, the 10580s, the 10590s, the 10600s, the 10610s, the 10620s, the 10630s, the 10640s, the 10650s, the 10660s, the 10670s, the 10680s, the 10690s, the 10700s, the 10710s, the 10720s, the 10730s, the 10740s, the 10750s, the 10760s, the 10770s, the 10780s, the 10790s, the 10800s, the 10810s, the 10820s, the 10830s, the 10840s, the 10850s, the 10860s, the 10870s, the 10880s, the 10890s, the 10900s, the 10910s, the 10920s, the 10930s, the 10940s, the 10950s, the 10960s, the 10970s, the 10980s, the 10990s, the 11000s, the 11010s, the 11020s, the 11030s, the 11040s, the 11050s, the 11060s, the 11070s, the 11080s, the 11090s, the 11100s, the 11110s, the 11120s, the 11130s, the 11140s, the 11150s, the 11160s, the 11170s, the 11180s, the 11190s, the 11200s, the 11210s, the 11220s, the 11230s, the 11240s, the 11250s, the 11260s, the 11270s, the 11280s, the 11290s, the 11300s, the 11310s, the 11320s, the 11330s, the 11340s, the 11350s, the 11360s, the 11370s, the 11380s, the 11390s, the 11400s, the 11410s, the 11420s, the 11430s, the 11440s, the 11450s, the 11460s, the 11470s, the 11480s, the 11490s, the 11500s, the 11510s, the 11520s, the 11530s, the 11540s, the 11550s, the 11560s, the 11570s, the 11580s, the 11590s, the 11600s, the 11610s, the 11620s, the 11630s, the 11640s, the 11650s, the 11660s, the 11670s, the 11680s, the 11690s, the 11700s, the 11710s, the 11720s, the 11730s, the 11740s, the 11750s, the 11760s, the 11770s, the 11780s, the 11790s, the 11800s, the 11810s, the 11820s, the 11830s, the 11840s, the 11850s, the 11860s, the 11870s, the 11880s, the 11890s, the 11900s, the 11910s, the 11920s, the 11930s, the 11940s, the 11950s, the 11960s, the 11970s, the 11980s, the 11990s, the 12000s, the 12010s, the 12020s, the 12030s, the 12040s, the 12050s, the 12060s, the 12070s, the 12080s, the 12090s, the 12100s, the 12110s, the 12120s, the 12130s, the 12140s, the 12150s, the 12160s, the 12170s, the 12180s, the 12190s, the 12200s, the 12210s, the 12220s, the 12230s, the 12240s, the 12250s, the 12260s, the 12270s, the 12280s, the 12290s, the 12300s, the 12310s, the 12320s, the 12330s, the 12340s, the 12350s, the 12360s, the 12370s, the 12380s, the 12390s, the 12400s, the 12410s, the 12420s, the 12430s, the 12440s, the 12450s, the 12460s, the 12470s, the 12480s, the 12490s, the 12500s, the 12510s, the 12520s, the 12530s, the 12540s, the 12550s, the 12560s, the 12570s, the 12580s, the 12590s, the 12600s, the 12610s, the 12620s, the 12630s, the 12640s, the 12650s, the 12660s, the 12670s, the 12680s, the 12690s, the 12700s, the 12710s, the 12720s, the 12730s, the 12740s, the 12750s, the 12760s, the 12770s, the 12780s, the 12790s, the 12800s, the 12810s, the 12820s, the 12830s, the 12840s, the 12850s, the 12860s, the 12870s, the 12880s, the 12890s, the 12900s, the 12910s, the 12920s, the 12930s, the 12940s, the 12950s, the 12960s, the 12970s, the 12980s, the 12990s, the 13000s, the 13010s, the 13020s, the 13030s, the 13040s, the 13050s, the 13060s, the 13070s, the 13080s, the 13090s, the 13100s, the 13110s, the 13120s, the 13130s, the 13140s, the 13150s, the 13160s, the 13170s, the 13180s, the 13190s, the 13200s, the 13210s, the 13220s, the 13230s, the 13240s, the 13250s, the 13260s, the 13270s, the 13280s, the 13290s, the 13300s, the 13310s, the 13320s, the 13330s, the 13340s, the 13350s, the 13360s, the 13370s, the 13380s, the 13390s, the 13400s, the 13410s, the 13420s, the 13430s, the 13440s, the 13450s, the 13460s, the 13470s, the 13480s, the 13490s, the 13500s, the 13510s, the 13520s, the 13530s, the 13540s, the 13550s, the 13560s, the 13570s, the 13580s, the 13590s, the 13600s, the 13610s, the 13620s, the 13630s, the 13640s, the 13650s, the 13660s, the 13670s, the 13680s, the 13690s, the 13700s, the 13710s, the 13720s, the 13730s, the 13740s, the 13750s, the 13760s, the 13770s, the 13780s, the 13790s, the 13800s, the 13810s, the 13820s, the 13830s, the 13840s, the 13850s, the 13860s, the 13870s, the 13880s, the 13890s, the 13900s, the 13910s, the 13920s, the 13930s, the 13940s, the 13950s, the 13960s, the 13970s, the 13980s, the 13990s, the 14000s, the 14010s, the 14020s, the 14030s, the 14040s, the 14050s, the 14060s, the 14070s, the 14080s, the 14090s, the 14100s, the 14110s, the 14120s, the 14130s, the 14140s, the 14150s, the 14160s, the 14170s, the 14180s, the 14190s, the 14200s, the 14210s, the 14220s, the 14230s, the 14240s, the 14250s, the 14260s, the 14270s, the 14280s, the 14290s, the 14300s, the 14310s, the 14320s, the 14330s, the 14340s, the 14350s, the 14360s, the 14370s, the 14380s, the 14390s, the 14400s, the 14410s, the 14420s, the 14430s, the 14440s, the 14450s, the 14460s, the 14470s, the 14480s, the 14490s, the 14500s, the 14510s, the 14520s, the 14530s, the 14540s, the 14550s, the 14560s, the 14570s, the 14580s, the 14590s, the 14600s, the 14610s, the 14620s, the 14630s, the 14640s, the 14650s, the 14660s, the 14670s, the 14680s, the 14690s, the 14700s, the 14710s, the 14720s, the 14730s, the 14740s, the 14750s, the 14760s, the 14770s, the 14780s, the 14790s, the 14800s, the 14810s, the 14820s, the 14830s, the 14840s, the 14850s, the 14860s, the 14870s, the 14880s, the 14890s, the 14900s, the 14910s, the 14920s, the 14930s, the 14940s, the 14950s, the 14960s, the 14970s, the 14980s, the 14990s, the 15000s, the 15010s, the 15020s, the 15030s, the 15040s, the 15050s, the 15060s, the 15070s, the 15080s, the 15090s, the 15100s, the 15110s, the 15120s, the 15130s, the 15140s, the 15150s, the 15160s, the 15170s, the 15180s, the 15190s, the 15200s, the 15210s, the 15220s, the 15230s, the 15240s, the 15250s, the 15260s, the 15270s, the 15280s, the 15290s, the



1 The first step is to apply the base. Take the colour for the foundation from the neck rather than the face. After applying foundation all over the face, use powder to set it. It is important to get a good matt finish.

2 Intensify the brow bone with a dark shade under the eyebrows and a light tone 'rust' on the brow. A small amount of light eye shadow on the lids acts as a basis for the main colour, which should be slightly paler than the skin tone.

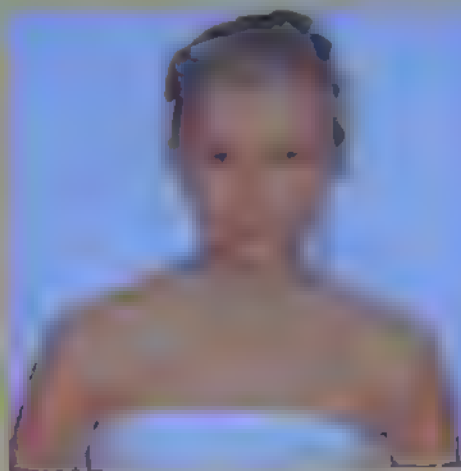
3 Further intensify the eyes, adding colour to suit. Place the emphasis on the outsides of the eyes. Apply blusher to the cheekbones with a large, soft brush. Always blend colours to avoid harsh edges between one tone and the next.

4 The soft, smudged effect on the eyes is achieved using a soft pencil and blending with Eyeliner has been used, though not right across. The last thing used on the eyes is mascara. Blusher and lipstick are then added.

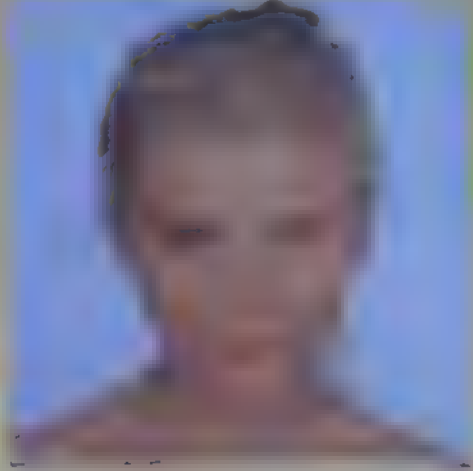
The final effect You can see how the make-up colours, which include browns and golds, have been chosen to suit the colours in the clothes.



Without make-up The model's skin is very smooth and clear. It is best to avoid using moisturizer unless absolutely essential, because it makes the skin shiny. As the model's skin is fair, a pale base is used.



The foundation The model is going to wear a low-cut dress, so the base is taken down on to her shoulders. Blend with a sponge as this also takes up any excess, then powder to set the base.



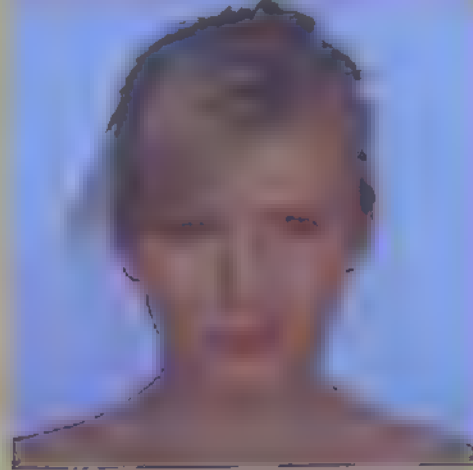
The eyes The eyebrows are brushed upwards to enhance the shape. The pale skin allows the eye shadow colours. Blue and pink eye shadow are used to complement the eye colour.



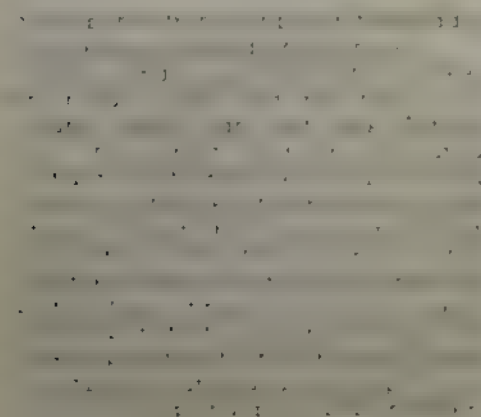
Finished eyes The mascara is added last to avoid smudging it. The lashes are brushed upwards to accentuate their shape. Blusher is applied next to enhance the shape of the cheekbones.



Lip lines The lips are outlined in a dark colour. Be careful not to go too near the edge, or the colour will bleed on to the surrounding skin. A lipstick pencil is ideal for this purpose.

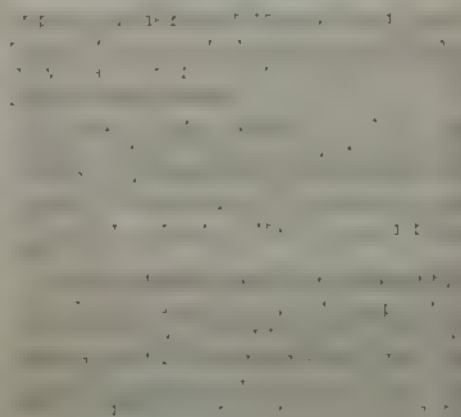


Full lips Smudge the outline inwards and blend in with a lighter colour using a lipstick brush. Finally, apply powder to set the make-up. This keeps it in good conditions for at least a few hours.

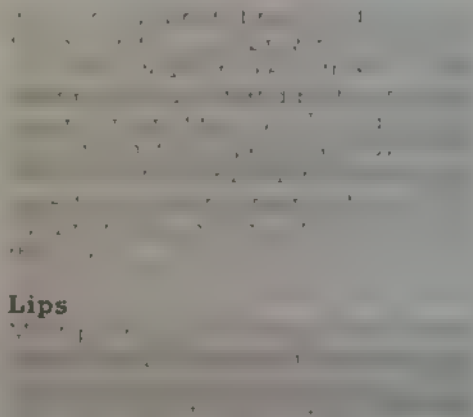


Eyes

The eye shadow is applied in a light, airy manner, using a soft brush. The blue and pink shades are blended together to create a soft, natural look. The mascara is applied to the upper and lower lashes, brushing them upwards to accentuate their shape.



The lip lines are defined with a dark lipstick pencil, applied carefully to avoid bleeding into the surrounding skin. The full lips are then smudged inwards and blended with a lighter shade of lipstick, creating a soft, natural look.



Lips

The lips are outlined with a dark lipstick pencil, applied carefully to avoid bleeding into the surrounding skin. The full lips are then smudged inwards and blended with a lighter shade of lipstick, creating a soft, natural look. Finally, a light dusting of powder is applied to set the makeup.

[illegible]

...with soft focus or you can use the
...textured foundation and the finest

[illegible]

If you are attempting amateur photography, especially in color, it's best to use a professional model. They tend to take good care of themselves and their body skin, and they normally have an all-over tan. This eliminates the problem of covering up blemishes, marks, which even for the professional makeup artist is a difficult task.

[illegible]

2507

Snapshot cameras

Now that the fully automatic snapshot camera is firmly established in 35 mm as well as various other formats, many amateurs might wish to pack one of these as a convenient or fun camera, but would you be satisfied with the performance?



The choice of cameras available to the casual photographer is varied and large

...the choice of cameras available to the casual photographer is varied and large. The range of options is vast, from compact point-and-shoot models to more complex rangefinders and SLRs. Many manufacturers offer a wide variety of lenses and accessories to suit different shooting styles. The key is to find a camera that is easy to use, reliable, and offers the features you need for your photography.

...the choice of cameras available to the casual photographer is varied and large. The range of options is vast, from compact point-and-shoot models to more complex rangefinders and SLRs. Many manufacturers offer a wide variety of lenses and accessories to suit different shooting styles. The key is to find a camera that is easy to use, reliable, and offers the features you need for your photography.

Instant and non-instant prints



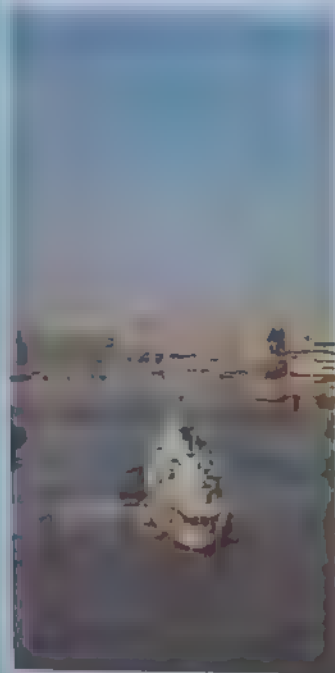
An instant print is a distinct advantage in many types of photography. You know immediately what the results are like and can give a print to someone whom you have photographed, such as friends met on holiday for instance. But this Polaroid print (taken by the AF 660) has dull unsaturated colours and a blue cast.



An unmagnified print taken with a Kodak Brownie appears sharper and much richer in colour than the Polaroid. This simple

Brownie gives grain-free shots even compared with 35 mm cameras, because it uses the much larger 127 film

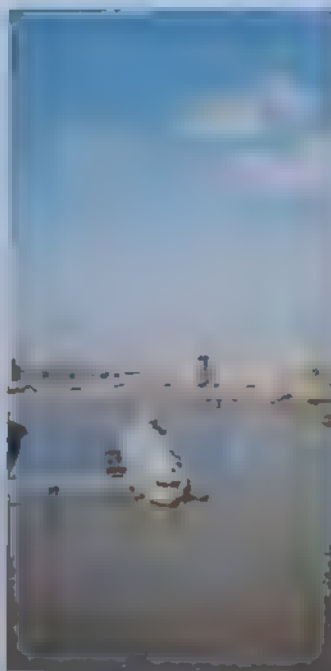
Comparison of infinity focus



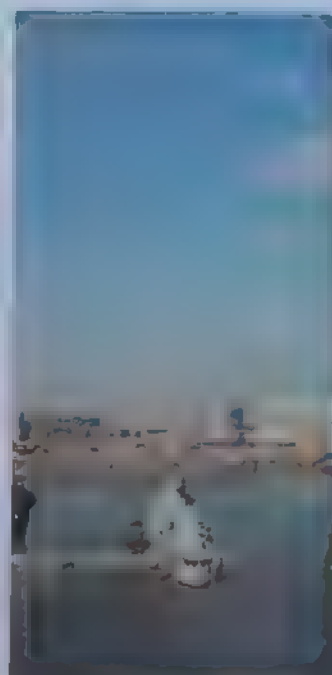
Nikon FM with 50 mm lens
(fully controlled)



Agfa Optima (auto exposure
manual focus)



Chinon Bellami (auto exposure, manual focus)



Canon Snappy 50 (fully automatic)

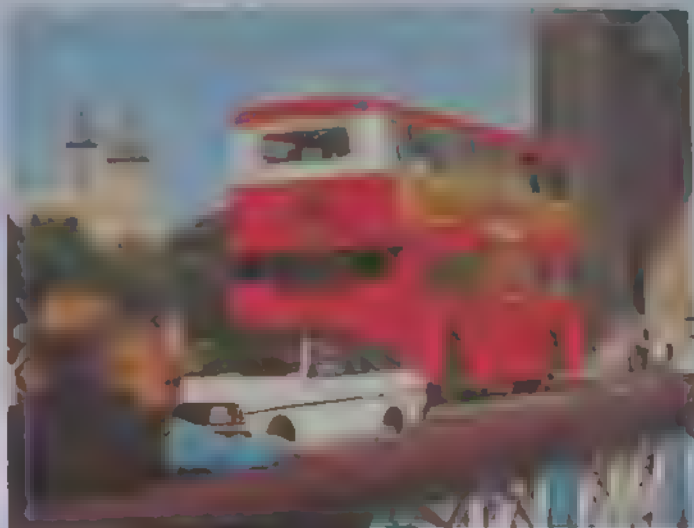
results, with the room otherwise in darkness were even more striking. The Agfa Optima gave the best results and the Balda the worst.

Which is best?

There is no perfect camera, just as there is no perfect car. But the test allowed us to draw conclusions as to the suitability

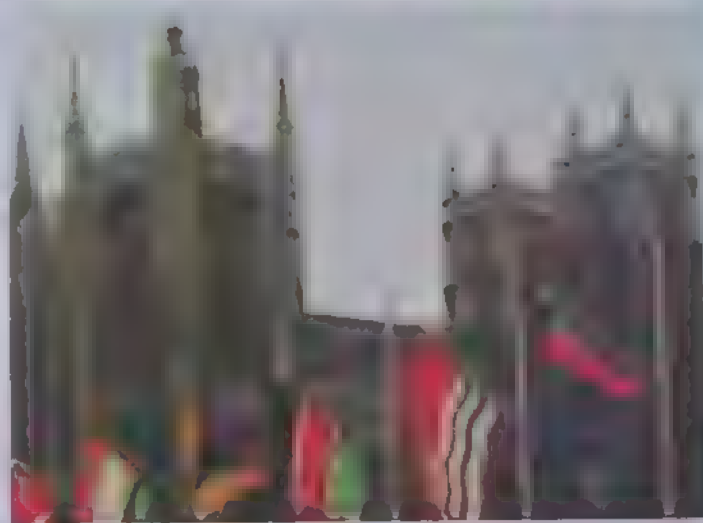
A photographer used to good results would be unhappy with the Disc Minolta, Brownie or Polaroid cameras on account of noticeable deficiencies such as graininess, distortion or colour casts. But each of these have their value—the Disc is ideal for parties, as it is easy to carry and use, and requires no attention, while the Polaroid has the advantage of giving instant results.

Comparison of formats



The effect of format on print quality is illustrated in these prints from negatives taken on a 35 mm (above), 110 (above right) and Kodak Disc camera (right). On close examination, each of the three prints appear as sharp as possible for the type of camera, and the difference in quality is due to graininess. In fact, a major drawback of 110 cameras is the small negative, which is only a quarter the area of a 35 mm negative. Even more extreme, the format of the Kodak disc camera is only half the size of a 110, so even the amount of

graininess in the Kodak prints is a remarkable achievement, made possible by several technological breakthroughs by Kodak. Foremost of these is the process for making the aspheric lens, the design of which is crucial for such a compact camera. Already, other manufacturers have developed disc cameras, but without an aspheric lens system, it will be virtually impossible to match Kodak's quality on similar sized cameras. Equally important for print quality is the standard of processing would be noticeable on a disc



Fixed focus range

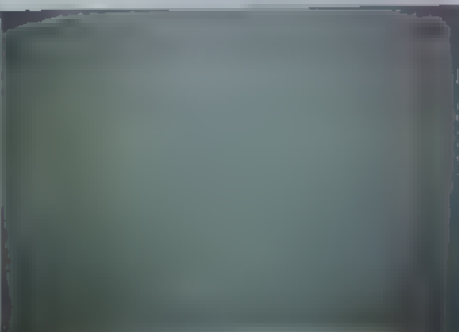
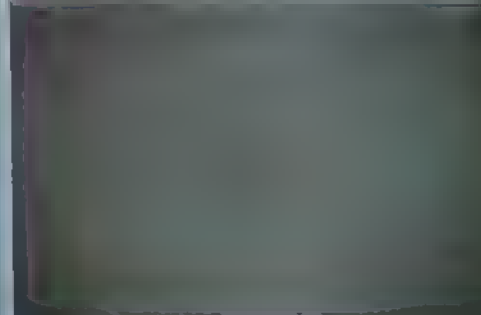
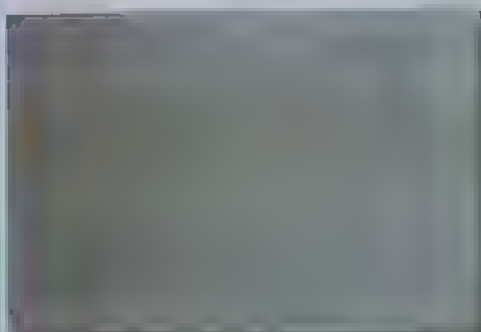


Fixed focus cameras give their best focus when the image lies within a range of about 3 to 10 m, as is evident on this shot by a Canon Snappy 20

Vignetting with and without flash

Vignetting without flash in daylight
Olympus Trip (below); Balda (bottom)

Vignetting with flash in darkness: Agfa Optima (below); Balda (bottom)





World of photography

Sonja Bullaty and Angelo Lomeo

Working individually and as a team, Angelo Lomeo and Sonja Bullaty have achieved a considerable reputation both for their commercial assignments and their many personal projects

A shared passion for photography brought Angelo Lomeo and Sonja Bullaty together as a husband and wife team over 20 years ago. Sonja Bullaty, a native of Chicago, moved to New York City in 1980 to work for a magazine and to pursue her own photography. Angelo Lomeo, who was already an established photographer, was also in New York City. They met through a mutual friend and began working together. Their collaboration has led to a diverse body of work, including commercial assignments and personal projects. Angelo Lomeo's work is characterized by its technical precision and its focus on light and shadow. Sonja Bullaty's work is more conceptual and often explores themes of identity and memory. Together, they have created a unique and powerful visual language.

John Hesse Inc.



Angelo Lomeo and Sonja Bullaty at home sitting under two of their own images

Motel porch By exposing mainly for the lit areas of the building Bullaty has created an atmospheric picture

New York Lomeo's dramatic use of light and shadow in this photograph creates a strong sense of depth and contrast.

Guggenheim Museum Lomeo's photograph of the Guggenheim Museum in New York City is a testament to his skill in capturing architectural details and the play of light and shadow.

The photograph of the Guggenheim Museum is a classic example of Lomeo's style, with its emphasis on geometric forms and the interplay of light and shadow. The image is a high-contrast black and white photograph that captures the essence of the building's architecture.

The photograph of the Guggenheim Museum is a testament to Lomeo's technical skill and his ability to create a powerful visual statement. The image is a masterful study of light and shadow, with the building's facade appearing as a series of dark, angular shapes against a bright, overexposed sky.

The photograph of the Guggenheim Museum is a classic example of Lomeo's style, with its emphasis on geometric forms and the interplay of light and shadow. The image is a high-contrast black and white photograph that captures the essence of the building's architecture.

The photograph of the Guggenheim Museum is a testament to Lomeo's technical skill and his ability to create a powerful visual statement. The image is a masterful study of light and shadow, with the building's facade appearing as a series of dark, angular shapes against a bright, overexposed sky.

The photograph of the Guggenheim Museum is a classic example of Lomeo's style, with its emphasis on geometric forms and the interplay of light and shadow. The image is a high-contrast black and white photograph that captures the essence of the building's architecture.

The photograph of the Guggenheim Museum is a testament to Lomeo's technical skill and his ability to create a powerful visual statement. The image is a masterful study of light and shadow, with the building's facade appearing as a series of dark, angular shapes against a bright, overexposed sky.

The photograph of the Guggenheim Museum is a classic example of Lomeo's style, with its emphasis on geometric forms and the interplay of light and shadow. The image is a high-contrast black and white photograph that captures the essence of the building's architecture.

The photograph of the Guggenheim Museum is a testament to Lomeo's technical skill and his ability to create a powerful visual statement. The image is a masterful study of light and shadow, with the building's facade appearing as a series of dark, angular shapes against a bright, overexposed sky.

The photograph of the Guggenheim Museum is a classic example of Lomeo's style, with its emphasis on geometric forms and the interplay of light and shadow. The image is a high-contrast black and white photograph that captures the essence of the building's architecture.

The photograph of the Guggenheim Museum is a testament to Lomeo's technical skill and his ability to create a powerful visual statement. The image is a masterful study of light and shadow, with the building's facade appearing as a series of dark, angular shapes against a bright, overexposed sky.

The photograph of the Guggenheim Museum is a classic example of Lomeo's style, with its emphasis on geometric forms and the interplay of light and shadow. The image is a high-contrast black and white photograph that captures the essence of the building's architecture.

The photograph of the Guggenheim Museum is a testament to Lomeo's technical skill and his ability to create a powerful visual statement. The image is a masterful study of light and shadow, with the building's facade appearing as a series of dark, angular shapes against a bright, overexposed sky.







Quinn, J. L. 1993. *Journal of the American Water Resources Association* 29:113-124.

[illegible]

Autumn in Central Park *A speeding yellow taxi framed between the changing colours of the trees transforms the image*

and a little while later, the two of them were sitting on the porch, looking at the stars. The night was clear and the stars were bright. They were both happy to have each other and to be able to look at the stars together. The night was perfect and they were both happy to be there.

Abandoned farmhouse The poppy-strewn grass in the foreground adds to the sense of atmosphere and quiet beauty

Weatherboarding Careful framing has eliminated the non-essential detail. Taken for Lorneo's 'Once upon a time' project

[illegible]

From photographing workers in the
copper mines he turned his
lens to the people of the North Atlantic
continent where the "war of
attrition" raged for 10 years.
His photographs were
displayed in the United States
and he started work with
Kodachrome and got work with
colours. He was prepared to send
them abroad to photograph extensive
colour features. Stories like June in
England or 'Kafka's Prague', which was



Angelo Lomao



Chromogenic films offer enormous latitude and very smooth grain. They also, however, present new difficulties in the darkroom, which must be overcome if you are to make the most of their special qualities.

[illegible][illegible]

your usual strength of the solutions

Exposure tests
A characteristic of chromogenic film is that shadow detail is recorded as if on low contrast material and yet the highlights are usually contrasty by

A black and white photograph showing a field of tall, thin grasses in the foreground. In the background, there is a large, dark, and heavily textured object, possibly a rock or a large piece of debris, which is out of focus. The overall scene is somewhat blurry, suggesting a shallow depth of field or camera movement.

The following guidelines have been developed according to guidelines once supplied with the basic kit. In each instance, expose negatives at half or whole stops either side of 'normal' exposure. Adjust exposure to the effective working latitude of the material, whether or not extra develop

2578

Pushing and pulling

Agfa Vario-XL processed in C41



Overexposure by four stops gives greater shadow detail



Normal exposure shows good detail in shadow and highlight areas



Underexposure by two stops gives higher image contrast

Ilford XP-1 processed in C41



Overexposure of the negative by four stops gives a loss of highlight detail



Normal exposure shows better blacks and whites than with the Agfa



Underexposure by two stops shows less tolerance than with the Agfa

Ilford XP-1 processed in XP-1



Overexposure of the negative by four stops—one second at f/16



Normal exposure here gives the highest contrast of the three tests



Underexposure by one stop showing even less tolerance than with C41

100 ASA in effect overexposes it by two stops, if normal development is given. Although this speed gives smoother grain than a 400 ASA exposure, sharpness may not be quite so good—a paradox explained only by the peculiar dye image forming characteristics of chromogenic film.

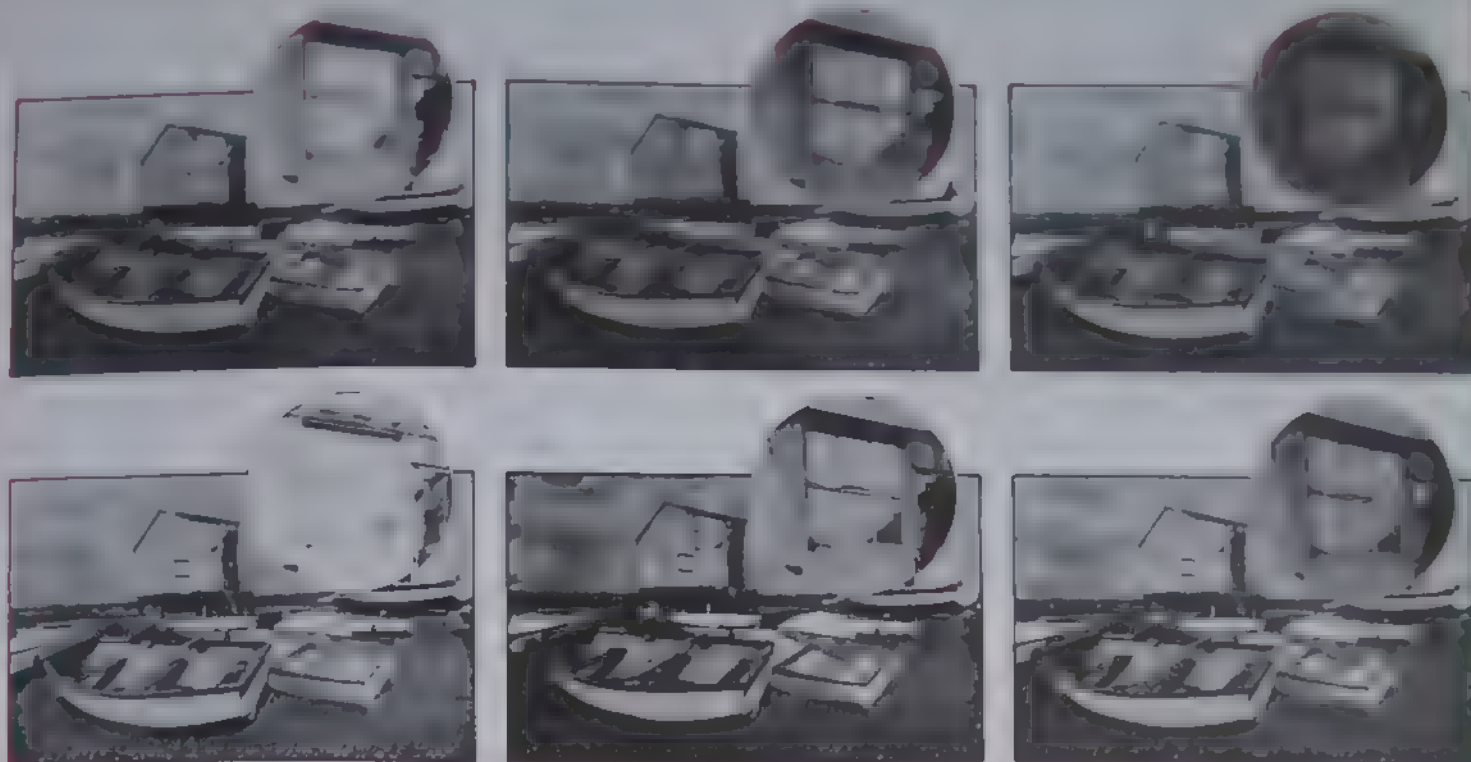
But if you do downrate, bear in mind the effects on the highlight parts of the image which may then require burning in if they are to show detail.

If you underexpose the film by uprating it without increasing development graininess will increase because fewer silver halide grains are used in the

formation of the image.

XP1 home processing

Processing at home is not difficult but requires care (see pages 394 to 397) whether you are using C41 or XP1 processes. The concentration and pH of solutions, and storage of film and



lack of grain can mean that prints of a deliberately harsh nature lose much of their punch'. In addition, the smoothness of tone can cause difficulties with reflecting, whereas stippled retouching is a vast improvement against the grain structure of conventional materials at that. It shows up clearly in the areas of smooth tone characteristic of chromogenic film.

Printing

Although the Camer effect—the scattering of light by the grains of a conventional silver image (see page 428)—is almost entirely eliminated on account of the dye image using a condenser enlarger gives slightly better results than those obtained by using a diffuser enlarger. But there is no appreciable difference in the print paper grade that is required with a silver image; a diffuser enlarger produces a softer contrast image than obtained with a condenser enlarger.

On the paper side, variable contrast papers such as Ilford Multigrade or Kodak Polycontrast permit the elaborate contrast grades dodging which may be needed for really 'difficult' chromogenic negatives. You could use one grade filter for the shadow and mid tones and another for highlights (see pages 424 to 428).

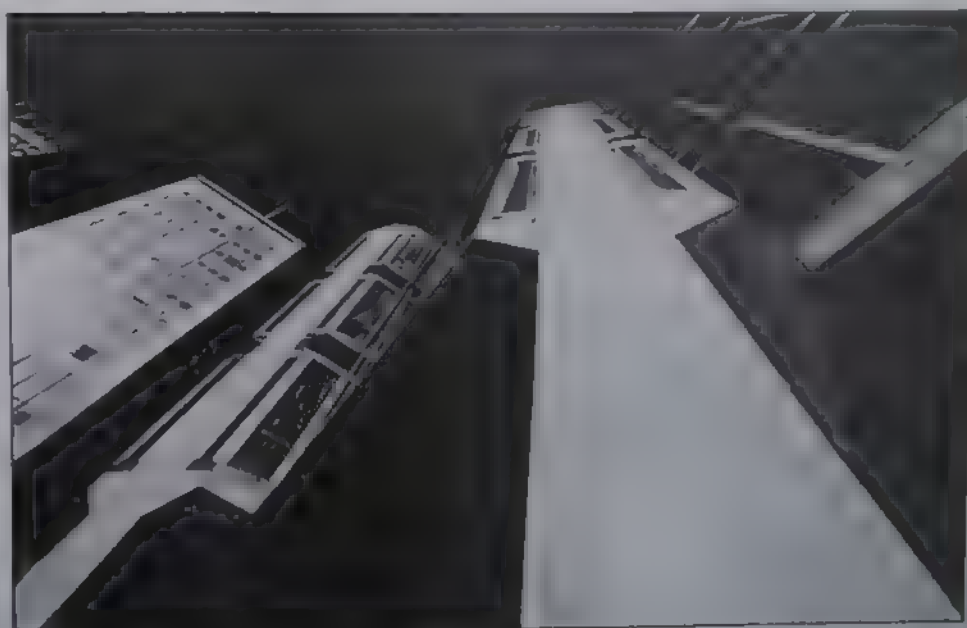
When printing on to variable contrast papers from chromogenic film you may possibly find the long exposures give a softer result and require a higher contrast filter than if you were printing from a conventional silver negative, but with experience you will learn to make allowances for this.

Comparing the chromogenics

Of the two, the Vario-XL seems to offer slightly better performance, but the difference is not particularly marked. It is made from a different material. Results are, however, very similar. Lower contrast than with XP1 and the sharpness enhancement character may be preferred by some, though seem much brighter with the XP1 film.

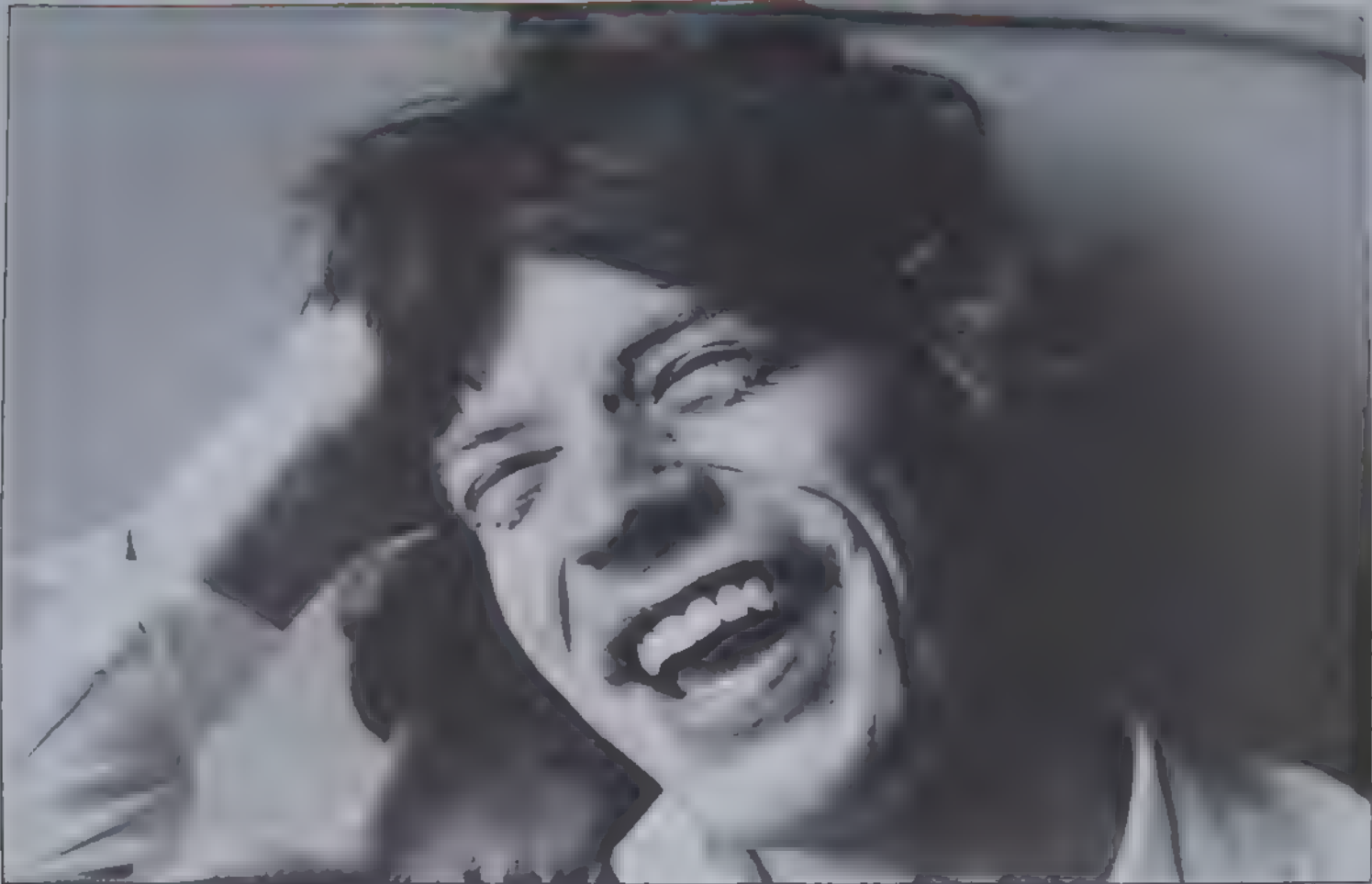
Both films respond well to over exposure—but avoid overdevelopment as this will result in unprintable dye densities. Neither film has under exposure—especially XP1, developed in its own chemicals—so always err on the side of overexposure if in doubt.

Boats For the test shots above the Agfa Vario-XL and the Ilford XP1 were both developed in C41 chemicals. For the centre shots of each the films were rated at 400 ASA, while on the left they were down rated to 125 ASA, and on the right uprated to 1600 ASA. The Agfa is shown at the top and the Ilford at the bottom. The Ilford gives better contrast overall, while the Agfa seems to be much softer. Although it seems best to rate both films at 400 ASA, a stop either way still gives acceptable results. In the shot below highlight detail present in the negative has been lost at the printing stage. In subjects such as this highlights can be burnt in.



Creative approach

Thinking in B&W



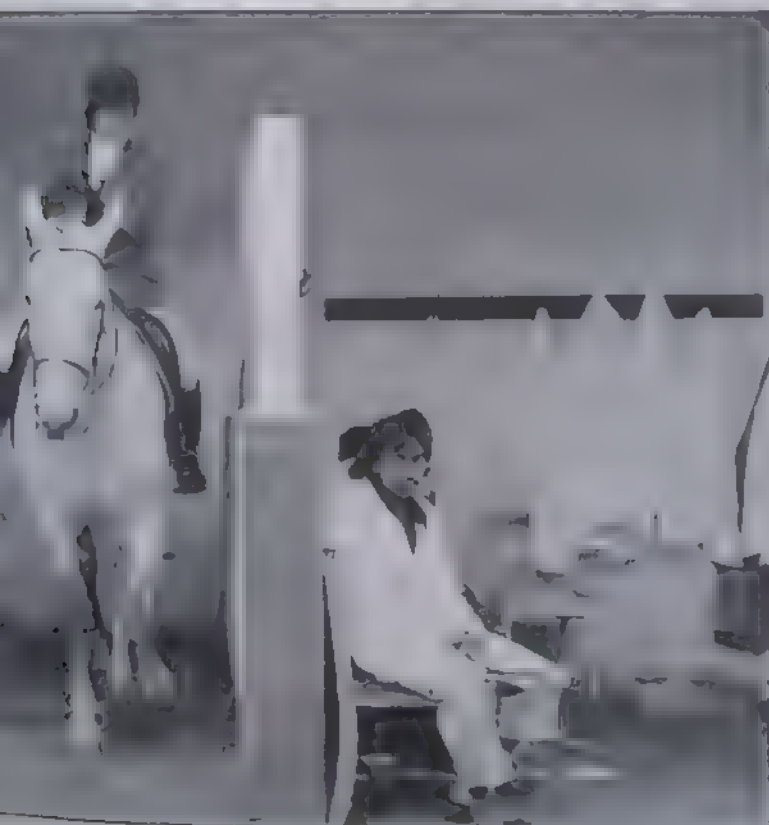
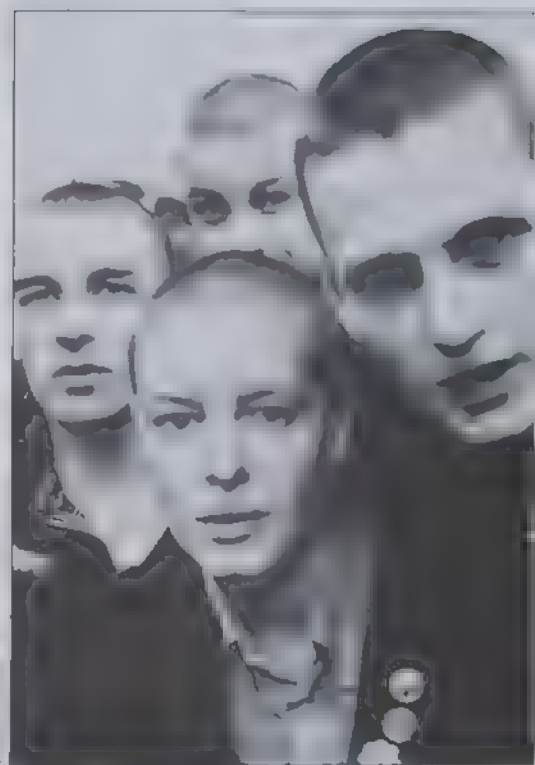
For many pictures, black and white can be far more effective than colour. Yet to make the most of its special qualities you have to learn to see the world in a different way—to think in black and white

For many pictures, black and white can be far more effective than colour. Yet to make the most of its special qualities you have to learn to see the world in a different way—to think in black and white. This is not to say that colour is less effective, but that black and white has its own unique qualities. It is a language of its own, and one that can be as powerful as any other. The world's greatest photographers are convinced of the merits of black and white, and they use it. Although Cartier Bresson is a colour very best photographs are in black and white.

world's greatest photographers are convinced of the merits of black and white, and they use it. Although Cartier Bresson is a colour very best photographs are in black and white.

This is not to say that colour is less effective, but that black and white has its own unique qualities. It is a language of its own, and one that can be as powerful as any other. The world's greatest photographers are convinced of the merits of black and white, and they use it. Although Cartier Bresson is a colour very best photographs are in black and white.





Mick Jagger The simplicity of b & w allows you to capture the essence of a personality in one gesture or expressive emotion without distractions.

South Africa The directness of b & w gives political images, like this hierarchy of privilege, impact often lacking in colour

Pin-ups A good b & w print has a richness of tone which can create an almost super-real look to textures—fabrics, skin, cold metal.

Skinheads Thinking in b & w means above all, going beyond the technical aim of accurate record and using its clarity to concentrate an essence image—here menace

Abbas, Magnum

AND THE

THE

1

THE



Boy with toy hand grenade In b & w the eye is held by the essentials—here the boy's posture and facial expression—and not led away by irrelevant colours

Man Remove the distraction of colour and proportion can become a more powerful tool—the tiny individual is dwarfed by his environment



Graham Smith

THE

beauty as you can, a beauty which is largely on the colour. For any but most skilled, a b & w shot of a scene is likely to appear dull and lifeless. It is



Bathers To exploit the possibilities of b & w, you must pre-visualize a garish colourful scene as a source of smoothly restrained grey tones and shapes

[illegible]

As accuracy may be more important than aesthetic interpretation, it is no longer enough to automatically use the exposure given by the camera. It is necessary to decide what should be taken, what kind of treatment should be given. Will the subject be better in low key or in high key? Will grey tones which are essential to melancholy result? Or would high key be more appropriate with a predominantly white print, with details being picked out in black? Which feature of the print will be of greatest importance? Is it the texture, the form, the shapes or (as will usually be the case) some combination of



James Pavlou

materials and processes, among them the element of grain.

choice about the graininess of the photograph coarse grain is often a result of fast films and is often desirable because the light is poor. However, there is no reason to use a coarse-grained film when the light is good, however, it is often used for its graininess. The texture of graininess is preferred by many people, but it interferes very little with the image, but noticeable graininess makes the presence of the photographic process more obvious aesthetically in the same way that brush strokes in painting may reinforce the image. The use of a fast, grainy film to photograph dark stormclouds can give them greater weight and presence in the picture; whereas with a normal sky, a fine-grained film can preserve the delicacy of light clouds. The texture of graininess is most apparent in large, evenly-toned areas that are intermediate shades

Another technically based quality of black and white photography that can be controlled in a way that is rarely possible with colour is contrast. Essentially, contrast in a picture is a measure of the spread of tones, from light to dark. Although with colour film there is little scope for altering the range of tones significantly, short of abandoning realism, contrast control in black and white photography is an integral part of

the present, you should be aware of the fact that the

Key points

Look at the world as a collection of shapes, patterns, textures and tones

Decide whether an image depends on colour for its effect—will the absence of colour be an advantage?

Compose carefully remembering that all the work of composition has to be done by grey tones and that the eye is drawn to areas of light tone

Use specific films and filters to reinforce the effect you have in mind

Think about how this image will be printed—high key or low key, soft and flat or hard and contrasty?

Practice looking at the world in black and white, ignoring colours

Work on the ability to visualise the final print in your imagination while looking at the subject

Sheep If in colour, the rich green grass would have dominated and suppressed other elements such as the tree's shape—b & w can often give a better balance

the photographer is photographing a landscape with a bright sky without filtration. The results are compared with the final results using orange and red filters and

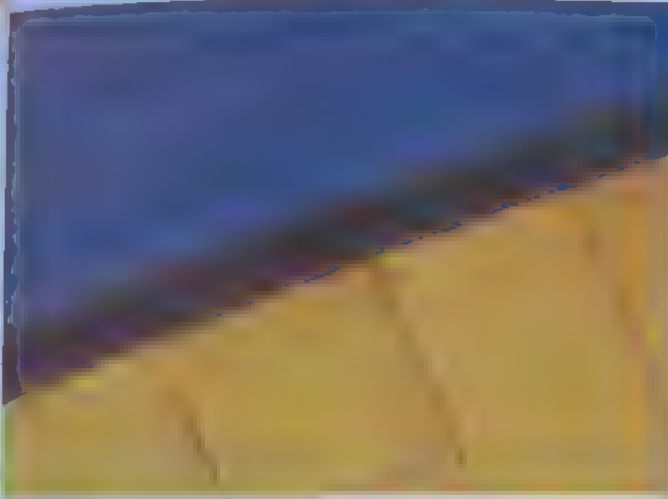
But however much, with a b & w in the dark field, it is important not to let the technique become the be all and end all. More perhaps even than colour, the original image must be strong—you can never fall back on pre-emptive rescue a basically weak subject itself must work—or at the very least have an interesting shape.

Many people see black and white as old-fashioned, the poor cousin of colour. It is a different rather than an inferior medium. Colour photography's great appeal lies in its ability to photograph the world as we see it, but since recording the world is a rather limited ambition. Beyond this, in the world of creative photography, black and white photography will continue to have a value of its own, no more inferior to colour than charcoal drawings are to oil paintings.

What went wrong?

ABSTRACTS

For successful abstracts you must make good use of colour, graphic elements, and what John Sims calls 'the puzzle element'



For a photo to form a successful abstract image, it must either be made up from simple elements which when combined produce a strong visual statement. This statement can be created in a number of ways, by the use of colour, graphic elements, or a combination of the three. The first example does not really succeed in any of these ways. To improve the photograph I would stand further away from the door/wall, and wait until the evening sun gives a stronger shadow. This would help to separate the door from the wall and at the same time lift the contours of both surfaces significantly. To strengthen the composition I would frame vertically and alter the relation of the two basic elements so that one dominates—as it stands, the photo suffers from an uncomfortable symmetry.



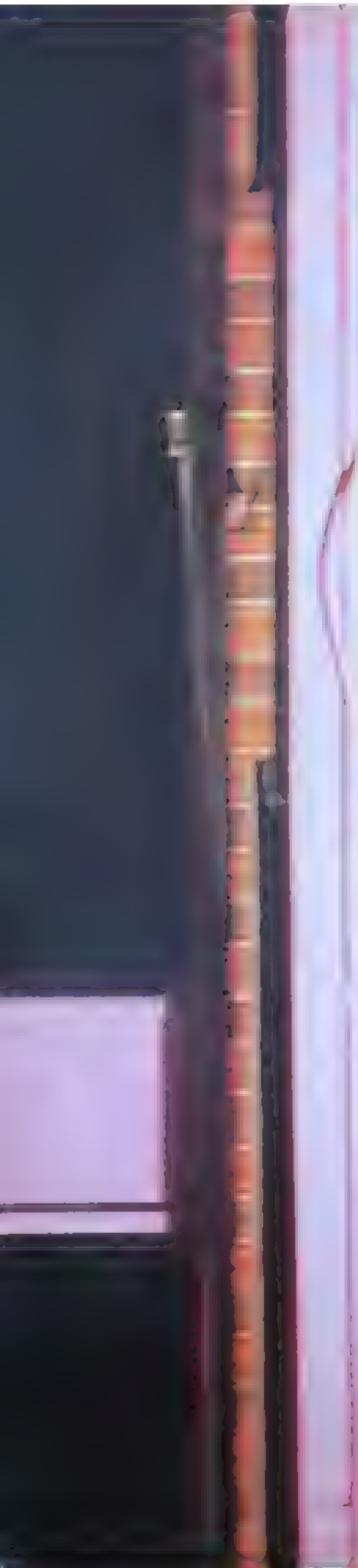
grapher has allowed the subject the freedom to be a dominant element. To make this abstract I would frame vertically and more to the left using the 'H' of the photo to echo the lines of the rotor blades. I would also make the cockpit unrecognizable to provide a stronger abstract element and if I had time I would be tempted to wait for a blue sky to give more variety of colour — perhaps using a polarizing filter to strengthen the effect.



I find this example particularly intriguing because again it appears to fulfill my main conditions for a successful abstract photograph. The colours are tonally strong and well saturated, the combination of circular shapes against the clean lines of the deep brown and ultramarine background looks good; the puzzle element is clearly present. Unfortunately the picture falls down on three major points. The scratches on the plastic filter holder would, with any substantial degree of enlargement, both desaturate the red and become very distracting. Secondly, the light area in the top lefthand corner is not strong enough for the composition and reduces the impact of the deeper hues in the remainder of the picture. This problem is easily solved by cropping in from the left. Finally, the whole image appears soft.

I quite like the tonal range of the shot and the contrast between the irregular curved shapes and the metallic blocks in the centre of the frame. However the more I look at the tarpaulin in the foreground, especially its frayed and out of focus edges, the more dissatisfied I become with the whole image. It is the central area which provides most of the scene's abstract potential. I would have concentrated on the blocks, the textured tarpaulin and the sky, trying wide and macro lenses, perhaps with a polarizing filter. Tight cropping here would have helped achieve the unity of composition which marks the successful abstract.







Creative approach

Distortion

Many photographers strive to achieve an accurate record of the world, but the creative photographer should have no such limited aim. You can distort the world deliberately to produce startling images from the most ordinary subjects



John de Visser

distortion is a creative approach to photography. It is a way of seeing the world through a lens that is not perfectly straight. It is a way of making the world look different, of making it look like a dream or a nightmare. It is a way of making the world look like a painting or a sculpture. It is a way of making the world look like a story or a mystery. It is a way of making the world look like a place where anything is possible.

There are many ways to create distortion in photography. One way is to use a wide-angle lens, which makes objects appear to be further away than they are. Another way is to use a telephoto lens, which makes objects appear to be closer than they are. A third way is to use a fisheye lens, which distorts the image into a circular shape. A fourth way is to use a lens that is not perfectly straight, which creates a wavy or curved effect. A fifth way is to use a lens that is not perfectly clear, which creates a hazy or blurry effect. A sixth way is to use a lens that is not perfectly focused, which creates a soft or out-of-focus effect. A seventh way is to use a lens that is not perfectly aligned, which creates a tilted or skewed effect. A eighth way is to use a lens that is not perfectly sized, which creates a distorted or warped effect. A ninth way is to use a lens that is not perfectly shaped, which creates a distorted or warped effect. A tenth way is to use a lens that is not perfectly colored, which creates a distorted or warped effect.

Rain With a long exposure, moving coloured objects and lights become more or less blurred streaks, particularly effective against the blacks of night

Reflection Photographing reflections is easy, but to succeed they must, as here, be genuinely interesting: you should try to be selective



Francis Bacon

include the use of colour and texture. But there need to use only the commercial

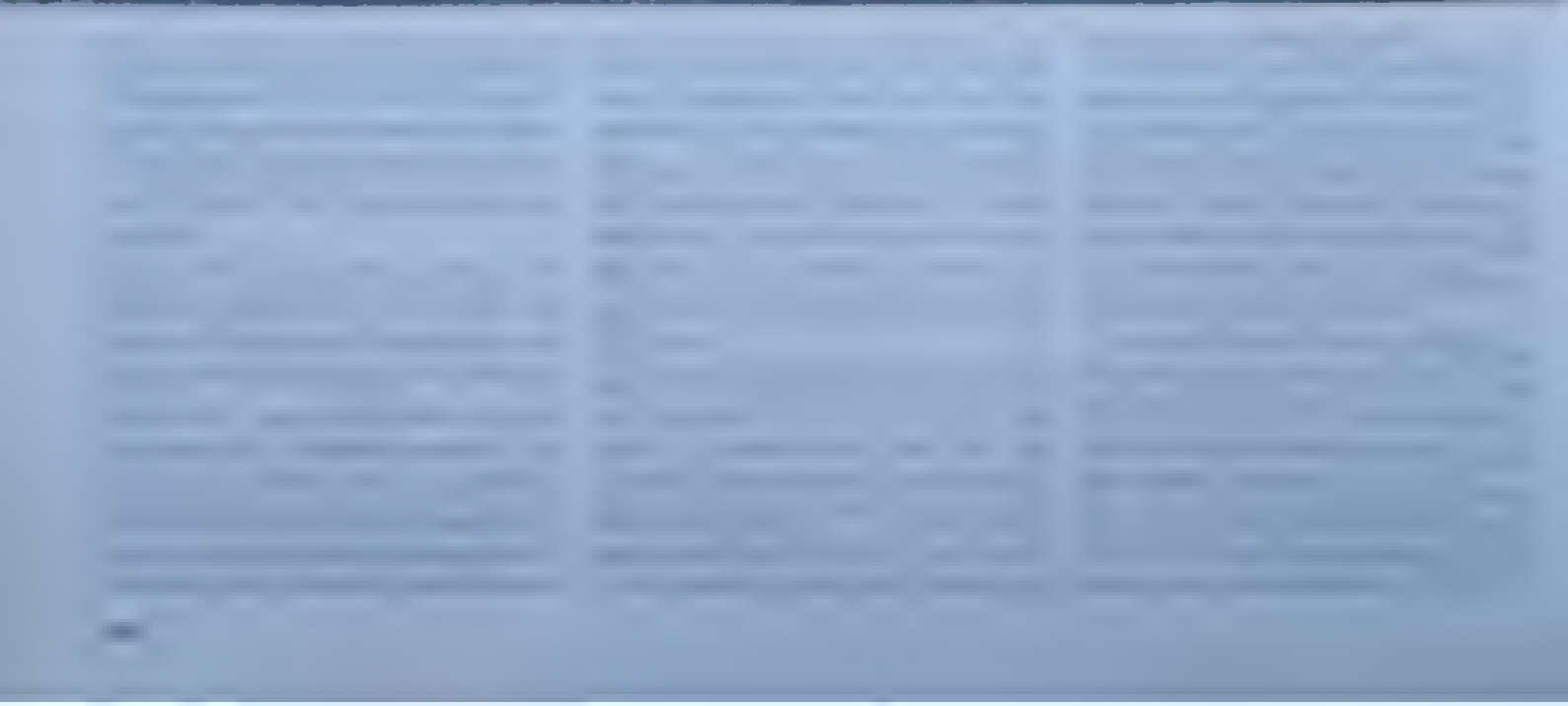
bulging eyes over a receding

Apple A surreal image—distortion achieved with a wide angle lens. When taking shots of this usually precision which is the key to

Trinidad distortion resulting from zooming during a long exposure—and a sense of motion and energetic

Portrait Using your own technique produces really original results. Science fiction writer Arthur C. Clarke seen through a large fresnel lens







Nude There is no limit to the distortions that can be produced by curved mirrors. They generally achieve the most effective results with objects whose shape is familiar.

Stretched This kind of elongated image is the result of using an anamorphic lens. Popular in movie photography, such lenses require adaptors for still cameras.

David Bailey



Hypersensitization

When astronomers are faced with hour-long exposures at the telescope, they must make sure that the emulsions are working as efficiently as possible. Hypersensitization brings emulsions to their ultimate performance.

the film is not exposed to light. The film is then developed in a solution of sodium hydroxide and sodium sulfide. The film is then washed in a solution of sodium hydroxide and sodium sulfide. The film is then dried in a vacuum oven.

The film is then exposed to light. The film is then developed in a solution of sodium hydroxide and sodium sulfide. The film is then washed in a solution of sodium hydroxide and sodium sulfide. The film is then dried in a vacuum oven.

The film is then exposed to light. The film is then developed in a solution of sodium hydroxide and sodium sulfide. The film is then washed in a solution of sodium hydroxide and sodium sulfide. The film is then dried in a vacuum oven.

The film is then exposed to light. The film is then developed in a solution of sodium hydroxide and sodium sulfide. The film is then washed in a solution of sodium hydroxide and sodium sulfide. The film is then dried in a vacuum oven.

The film is then exposed to light. The film is then developed in a solution of sodium hydroxide and sodium sulfide. The film is then washed in a solution of sodium hydroxide and sodium sulfide. The film is then dried in a vacuum oven.

The film is then exposed to light. The film is then developed in a solution of sodium hydroxide and sodium sulfide. The film is then washed in a solution of sodium hydroxide and sodium sulfide. The film is then dried in a vacuum oven.

The film is then exposed to light. The film is then developed in a solution of sodium hydroxide and sodium sulfide. The film is then washed in a solution of sodium hydroxide and sodium sulfide. The film is then dried in a vacuum oven.

The film is then exposed to light. The film is then developed in a solution of sodium hydroxide and sodium sulfide. The film is then washed in a solution of sodium hydroxide and sodium sulfide. The film is then dried in a vacuum oven.

The film is then exposed to light. The film is then developed in a solution of sodium hydroxide and sodium sulfide. The film is then washed in a solution of sodium hydroxide and sodium sulfide. The film is then dried in a vacuum oven.

The film is then exposed to light. The film is then developed in a solution of sodium hydroxide and sodium sulfide. The film is then washed in a solution of sodium hydroxide and sodium sulfide. The film is then dried in a vacuum oven.

The film is then exposed to light. The film is then developed in a solution of sodium hydroxide and sodium sulfide. The film is then washed in a solution of sodium hydroxide and sodium sulfide. The film is then dried in a vacuum oven.

The film is then exposed to light. The film is then developed in a solution of sodium hydroxide and sodium sulfide. The film is then washed in a solution of sodium hydroxide and sodium sulfide. The film is then dried in a vacuum oven.

The film is then exposed to light. The film is then developed in a solution of sodium hydroxide and sodium sulfide. The film is then washed in a solution of sodium hydroxide and sodium sulfide. The film is then dried in a vacuum oven.

The film is then exposed to light. The film is then developed in a solution of sodium hydroxide and sodium sulfide. The film is then washed in a solution of sodium hydroxide and sodium sulfide. The film is then dried in a vacuum oven.

The film is then exposed to light. The film is then developed in a solution of sodium hydroxide and sodium sulfide. The film is then washed in a solution of sodium hydroxide and sodium sulfide. The film is then dried in a vacuum oven.

The film is then exposed to light. The film is then developed in a solution of sodium hydroxide and sodium sulfide. The film is then washed in a solution of sodium hydroxide and sodium sulfide. The film is then dried in a vacuum oven.

The film is then exposed to light. The film is then developed in a solution of sodium hydroxide and sodium sulfide. The film is then washed in a solution of sodium hydroxide and sodium sulfide. The film is then dried in a vacuum oven.

The film is then exposed to light. The film is then developed in a solution of sodium hydroxide and sodium sulfide. The film is then washed in a solution of sodium hydroxide and sodium sulfide. The film is then dried in a vacuum oven.

Physical methods

Black does not respond too well to light.

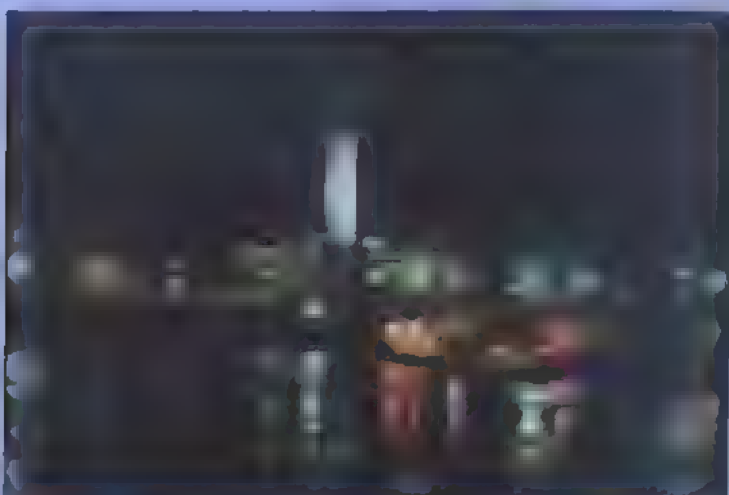
It is only too frequently found that their has been reduction in sensitivity. This is due to the primary Tri X, however, are reduced at over one stop of

the way of developing and fixation on the film is reduced. It is an evacuated chamber. And under vacuum, the rate of diffusion of oxygen is reduced. The effect is reduced to about one stop of oxygen removal which is the basis of all the important hypersensitization techniques.

The critical factor is the speed of application. A slow removal is often better as some gelatin subjected to a slow removal of oxygen and water is removed too rapidly and this can trap oxygen and



Night shot This was taken on Kodak Tri-X film, developed for 48 hours.



Hypersed The exposed film was left with a mercury drop for 48 hours.

oxygen. This is why the professional film manufacturer is standard humidity.

If you want to experiment with film kept under no latent vacuum for a few hours of latent. A small film speed will result but it will be approached also depending on the film batch. Expose and develop the film immediately after treatment and use the same film batch for consistency.

It is inconvenient to expose a film in a vacuum chamber. The camera man is better to replace the natural

oxygen and water by something so Nitrogen has been found best.

A simple variant of this is repeatedly replace air with dry nitrogen. The gas must be at least of White's quality or guaranteed oxygen. The speed gains can be reduced from an hour or so to several minutes.

The main importance of vacuum or gas hypersensitization is in their use as a combination or preliminary to other treatments. The most common

Baking

If a film is heated gently under the right conditions



Geoffrey Jot



Orion Nebula A ten minute exposure on normal 2415 film

Hypered After hydrogen soaking for seven hours at 40°C

Hydrogen treatment

For the hydrogen treatment, the film is placed in a container and the container is filled with hydrogen gas. The film is then soaked in the gas for a period of time. The gas is then removed and the film is developed. The film is then fixed and washed. The film is then dried and the result is a hypered image.

The effect of the hydrogen

treatment is to increase the sensitivity of the film. The film is then developed and the result is a hypered image. The effect of the hydrogen treatment is to increase the sensitivity of the film. The film is then developed and the result is a hypered image. The effect of the hydrogen treatment is to increase the sensitivity of the film. The film is then developed and the result is a hypered image.

Optical methods

The simplest technique has been used for a very long time. The mechanism of preflashing is to supply enough photons to form sub-latent images large enough to be relatively stable against thermal decay. This is about three to four photon events per developable site. Subsequent low level light is then absorbed more readily.

Preflashing can only be used where the background density is very low—in astronomical terms, where the skies are very dark. In bright night skies, as in moonlight, preflashing occurs automatically.

Chemical treatments

The only effective way of hypering some specialized infrared films is by some chemical treatment. Without this their storage life is too short and exposure times too long.

A very wide range of ideas have been proposed and they all need a high degree of skill. Briefly, the film is soaked in a solution of silver nitrate. The concentration

Vapour treatment

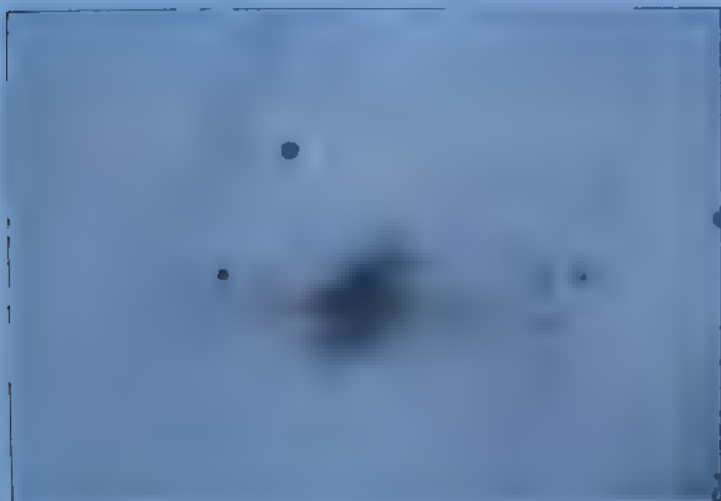
This used to be quite before the introduction of mercury vapour. The mercury was introduced into the film container and vapour rapidly permeated the film. The film was then developed and the result was a hypered image.

Advantages claimed for the simplicity and that the colour sensitivity and curves were unaffected. And the process could be repeated as needed if the film was used for a long time. The technique fell into disuse with the advent of modern films. It was believed that it was by mercury deposition sensitivity centres in the emulsion. These days the manufacturer adds a layer of metallic sensitizers, such as gold, to the emulsion.

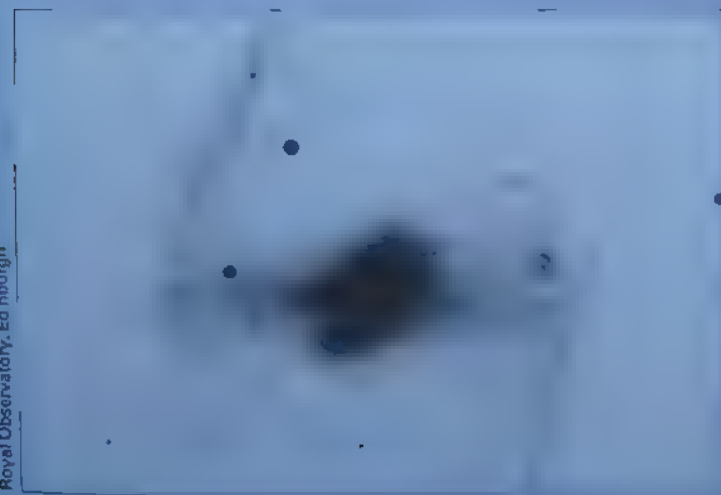
Another reason for the demise was the variability of the effect, probably due to poor airtightness of the containers. Today, mercury is regarded as a bad point and is difficult to buy. It must never be allowed to come into contact with aluminium nor with most metal cassettes.

Mercury hypering is still important, however. If you are experiencing variable results, particularly with colour films, check that you have no mercury anywhere on the film. Take a mercury thermometer into a darkroom because they are easily broken. Mercury effects are cumulative, both to you and the films and papers stored in a confined space.

hypering process. Afterwards the film deteriorate rapidly so it is seldom worth taking a further exposure. The process is not worth the trouble. If baking is taken far the film will be ruined. A good idea is to use a fast infrared emulsion. The film is then developed and the result is a hypered image.

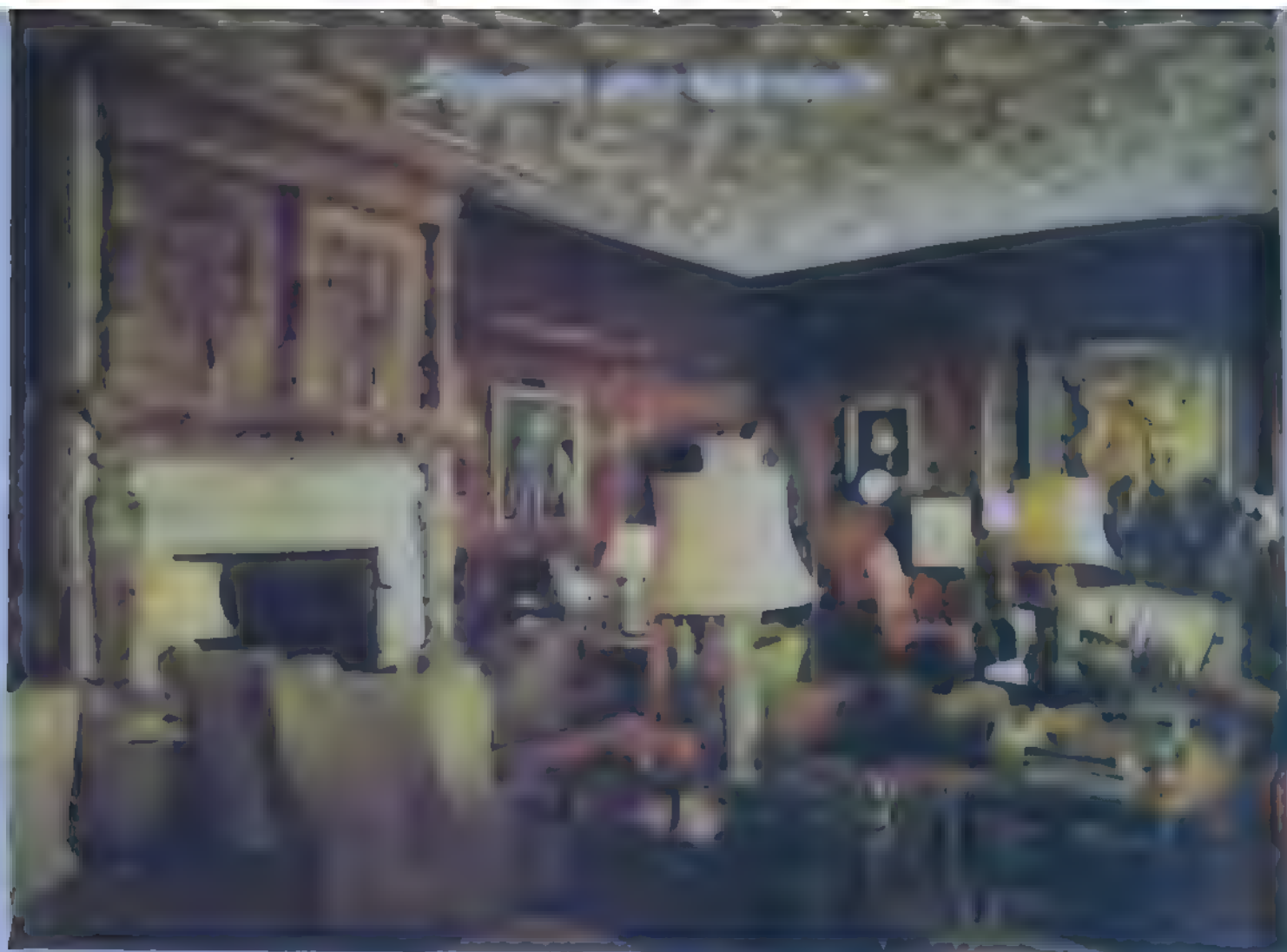


Spiral galaxy A 90 minute exposure on fast infrared emulsion



Hypered A slower infrared emulsion, soaked in silver nitrate

Royal Observatory, Edinburgh



Shooting interiors

Taking photographs of a room involves more than just switching the room lights on and snapping away. If you want the location to look its best, it is essential to take some care over your approach, particularly the lighting.

Shooting by available light



The drawing room was shot using both flash and available light – daylight and room lights. Eight exposures were made on the same sheet of film, with the room lights left on for five of them.

Church light The large windows and light interior allowed the church to be shot by available daylight alone.



Daylight only With just the light coming through the windows, the room looks fairly attractive. But there are many areas, such as the far corner, where detail is hidden in shadow



Colour cast With very long exposures, the picture can have a cast due to reciprocity failure. Here a 15 second exposure was made on Ektachrome 200, giving a very green picture.

[illegible][illegible][illegible]

6. A. $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$ $\frac{1}{8} \times \frac{1}{2} = \frac{1}{16}$ $\frac{1}{16} \times \frac{1}{2} = \frac{1}{32}$ $\frac{1}{32} \times \frac{1}{2} = \frac{1}{64}$ $\frac{1}{64} \times \frac{1}{2} = \frac{1}{128}$ $\frac{1}{128} \times \frac{1}{2} = \frac{1}{256}$ $\frac{1}{256} \times \frac{1}{2} = \frac{1}{512}$ $\frac{1}{512} \times \frac{1}{2} = \frac{1}{1024}$ $\frac{1}{1024} \times \frac{1}{2} = \frac{1}{2048}$ $\frac{1}{2048} \times \frac{1}{2} = \frac{1}{4096}$ $\frac{1}{4096} \times \frac{1}{2} = \frac{1}{8192}$ $\frac{1}{8192} \times \frac{1}{2} = \frac{1}{16384}$ $\frac{1}{16384} \times \frac{1}{2} = \frac{1}{32768}$ $\frac{1}{32768} \times \frac{1}{2} = \frac{1}{65536}$ $\frac{1}{65536} \times \frac{1}{2} = \frac{1}{131072}$ $\frac{1}{131072} \times \frac{1}{2} = \frac{1}{262144}$ $\frac{1}{262144} \times \frac{1}{2} = \frac{1}{524288}$ $\frac{1}{524288} \times \frac{1}{2} = \frac{1}{1048576}$ $\frac{1}{1048576} \times \frac{1}{2} = \frac{1}{2097152}$ $\frac{1}{2097152} \times \frac{1}{2} = \frac{1}{4194304}$ $\frac{1}{4194304} \times \frac{1}{2} = \frac{1}{8388608}$ $\frac{1}{8388608} \times \frac{1}{2} = \frac{1}{16777216}$ $\frac{1}{16777216} \times \frac{1}{2} = \frac{1}{33554432}$ $\frac{1}{33554432} \times \frac{1}{2} = \frac{1}{67108864}$ $\frac{1}{67108864} \times \frac{1}{2} = \frac{1}{134217728}$ $\frac{1}{134217728} \times \frac{1}{2} = \frac{1}{268435456}$ $\frac{1}{268435456} \times \frac{1}{2} = \frac{1}{536870912}$ $\frac{1}{536870912} \times \frac{1}{2} = \frac{1}{1073741824}$ $\frac{1}{1073741824} \times \frac{1}{2} = \frac{1}{2147483648}$ $\frac{1}{2147483648} \times \frac{1}{2} = \frac{1}{4294967296}$ $\frac{1}{4294967296} \times \frac{1}{2} = \frac{1}{8589934592}$ $\frac{1}{8589934592} \times \frac{1}{2} = \frac{1}{17179869184}$ $\frac{1}{17179869184} \times \frac{1}{2} = \frac{1}{34359738368}$ $\frac{1}{34359738368} \times \frac{1}{2} = \frac{1}{68719476736}$ $\frac{1}{68719476736} \times \frac{1}{2} = \frac{1}{137438953472}$ $\frac{1}{137438953472} \times \frac{1}{2} = \frac{1}{274877906944}$ $\frac{1}{274877906944} \times \frac{1}{2} = \frac{1}{549755813888}$ $\frac{1}{549755813888} \times \frac{1}{2} = \frac{1}{1099511627776}$ $\frac{1}{1099511627776} \times \frac{1}{2} = \frac{1}{2199023255552}$ $\frac{1}{2199023255552} \times \frac{1}{2} = \frac{1}{4398046511104}$ $\frac{1}{4398046511104} \times \frac{1}{2} = \frac{1}{8796093022208}$ $\frac{1}{8796093022208} \times \frac{1}{2} = \frac{1}{17592186044416}$ $\frac{1}{17592186044416} \times \frac{1}{2} = \frac{1}{35184372088832}$ $\frac{1}{35184372088832} \times \frac{1}{2} = \frac{1}{70368744177664}$ $\frac{1}{70368744177664} \times \frac{1}{2} = \frac{1}{140737488355328}$ $\frac{1}{140737488355328} \times \frac{1}{2} = \frac{1}{281474976710656}$ $\frac{1}{281474976710656} \times \frac{1}{2} = \frac{1}{562949953421312}$ $\frac{1}{562949953421312} \times \frac{1}{2} = \frac{1}{1125899906842624}$ $\frac{1}{1125899906842624} \times \frac{1}{2} = \frac{1}{2251799813685248}$ $\frac{1}{2251799813685248} \times \frac{1}{2} = \frac{1}{4503599627370496}$ $\frac{1}{4503599627370496} \times \frac{1}{2} = \frac{1}{9007199254740992}$ $\frac{1}{9007199254740992} \times \frac{1}{2} = \frac{1}{18014398509481984}$ $\frac{1}{18014398509481984} \times \frac{1}{2} = \frac{1}{36028797018963968}$ $\frac{1}{36028797018963968} \times \frac{1}{2} = \frac{1}{72057594037927936}$ $\frac{1}{72057594037927936} \times \frac{1}{2} = \frac{1}{144115188075855872}$ $\frac{1}{144115188075855872} \times \frac{1}{2} = \frac{1}{288230376151711744}$ $\frac{1}{288230376151711744} \times \frac{1}{2} = \frac{1}{576460752303423488}$ $\frac{1}{576460752303423488} \times \frac{1}{2} = \frac{1}{1152921504606846976}$ $\frac{1}{1152921504606846976} \times \frac{1}{2} = \frac{1}{2305843009213693952}$ $\frac{1}{2305843009213693952} \times \frac{1}{2} = \frac{1}{4611686018427387904}$ $\frac{1}{4611686018427387904} \times \frac{1}{2} = \frac{1}{9223372036854775808}$ $\frac{1}{9223372036854775808} \times \frac{1}{2} = \frac{1}{18446744073709551616}$ $\frac{1}{18446744073709551616} \times \frac{1}{2} = \frac{1}{36893488147419103232}$ $\frac{1}{36893488147419103232} \times \frac{1}{2} = \frac{1}{73786976294838206464}$ $\frac{1}{73786976294838206464} \times \frac{1}{2} = \frac{1}{147573952589676412928}$ $\frac{1}{147573952589676412928} \times \frac{1}{2} = \frac{1}{295147905179352825856}$ $\frac{1}{295147905179352825856} \times \frac{1}{2} = \frac{1}{590295810358705651712}$ $\frac{1}{590295810358705651712} \times \frac{1}{2} = \frac{1}{1180591620717411303424}$ $\frac{1}{1180591620717411303424} \times \frac{1}{2} = \frac{1}{2361183241434822606848}$ $\frac{1}{2361183241434822606848} \times \frac{1}{2} = \frac{1}{4722366482869645213696}$ $\frac{1}{4722366482869645213696} \times \frac{1}{2} = \frac{1}{9444732965739290427392}$ $\frac{1}{9444732965739290427392} \times \frac{1}{2} = \frac{1}{18889465931478580854784}$ $\frac{1}{18889465931478580854784} \times \frac{1}{2} = \frac{1}{37778931862957161709568}$ $\frac{1}{37778931862957161709568} \times \frac{1}{2} = \frac{1}{75557863725914323419136}$ $\frac{1}{75557863725914323419136} \times \frac{1}{2} = \frac{1}{151115727451828646838272}$ $\frac{1}{151115727451828646838272} \times \frac{1}{2} = \frac{1}{302231454903657293676544}$ $\frac{1}{302231454903657293676544} \times \frac{1}{2} = \frac{1}{604462909807314587353088}$ $\frac{1}{604462909807314587353088} \times \frac{1}{2} = \frac{1}{1208925819614629174706176}$ $\frac{1}{12089258196146291747$

[illegible][illegible]

Establishing the exposure

Estimating the Coefficient

Available lighting Switching the room lights on gives an improvement on daylight alone, though it is still not ideal. A 10R red filter was used to compensate for slight reciprocity failure.



Just flash Four flash units were used in all—three at the far end of the room, to the right of the camera, and a snooted one on the left. This shot shows how the flash contributes to the main shot.



bring them up to your eye level.

Using flash

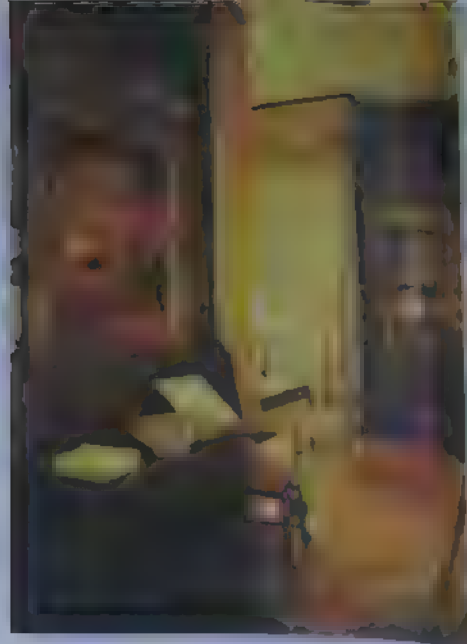
A great deal can be achieved with old flash guns. Unfortunately, however, they are not as powerful as modern units.

Old flash guns are often very noisy, and the light they produce is often very harsh. However, they can be used to great effect if you know how to use them. For example, you can use them to fill in the shadows of a subject, or to create a dramatic effect by lighting a subject from the side. You can also use them to create a soft, even light by using a diffuser. The key is to experiment and see what works for you.

which you saw in the previous photo. The flash was used to fill in the shadows of the subject.

The flash was used to fill in the shadows of the subject. The flash was used to fill in the shadows of the subject. The flash was used to fill in the shadows of the subject.

Another way to use flash is to create a dramatic effect by lighting a subject from the side. You can also use them to create a soft, even light by using a diffuser. The key is to experiment and see what works for you.



Best combination As there was daylight coming through the windows, daylight flash was used, with tungsten lights converted daylight using blue filters

The flash was used to fill in the shadows of the subject. The flash was used to fill in the shadows of the subject. The flash was used to fill in the shadows of the subject.

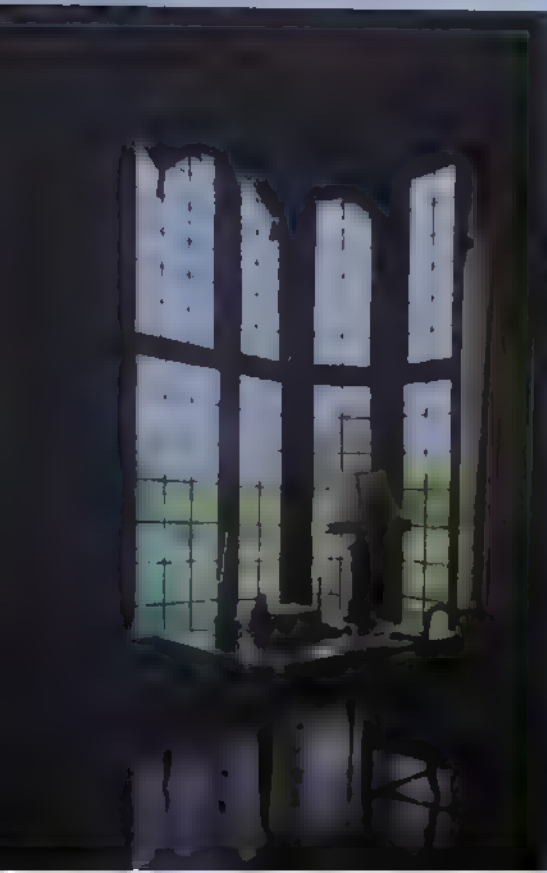
At a distance, might be reflected. The flash was used to fill in the shadows of the subject. The flash was used to fill in the shadows of the subject. The flash was used to fill in the shadows of the subject.

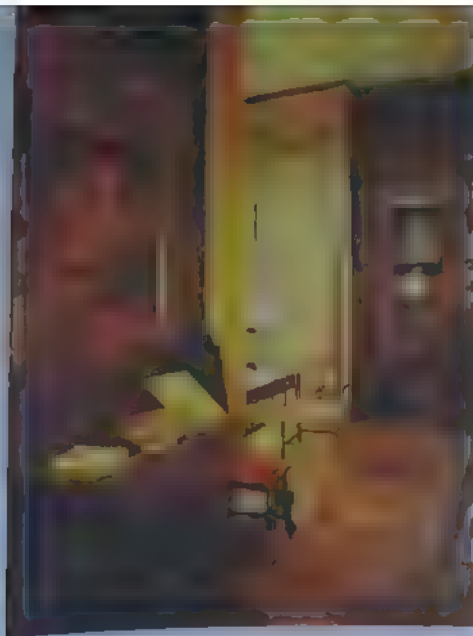
Fast shutters

The fast shutter is a very useful feature. It allows you to take pictures of fast-moving subjects without blur.

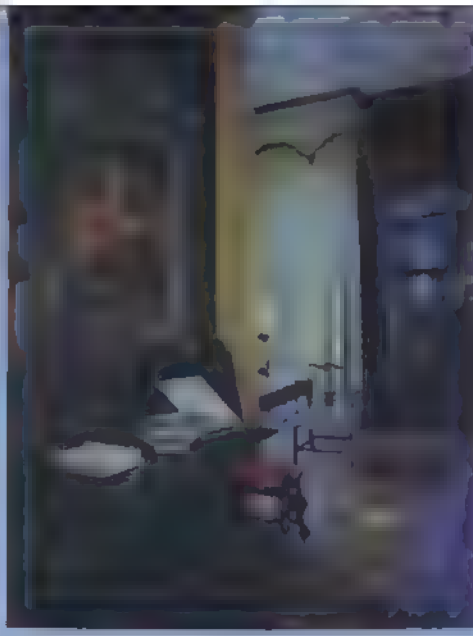
Take a close-up of a flower. Your flash will only give you a very short burst, but $f/5.6$ does not do much depth of field, and you need to use $f/11$. To get to $f/11$ you need to use $f/11$. You can not cover the whole flower with $f/11$ on a 35mm lens. The exposure will be too long. The exposure will be too long. The exposure will be too long.

Flash fill With no additional lighting, windows have too large a brightness range to record on film without losing detail (far left). Using flash allows you to expose for the outside scene and still show interior details of the room





Too orange This is similar to the previous shot, but without converting the lamps to daylight, resulting in an orange cast on the parts lit by tungsten



Too blue Switching to tungsten film gives the correct balance for the lights. But those areas lit by the daylight are far too blue



Just lights By excluding the daylight the scene is lit by the unfiltered lights alone. On tungsten film this gives correct colour rendering

...the light is not converted to daylight. This is similar to the previous shot, but without converting the lamps to daylight, resulting in an orange cast on the parts lit by tungsten.

...the light is not converted to daylight. This is similar to the previous shot, but without converting the lamps to daylight, resulting in an orange cast on the parts lit by tungsten.

...the light is not converted to daylight. This is similar to the previous shot, but without converting the lamps to daylight, resulting in an orange cast on the parts lit by tungsten.

...the light is not converted to daylight. This is similar to the previous shot, but without converting the lamps to daylight, resulting in an orange cast on the parts lit by tungsten.

Using tungsten lighting

Each kind of lighting is invaluable for colour work. But they have the advantage of being available at all times, and they are independent of the weather. Indoor lighting can be used with great effect, and it is not necessary to use high intensity quartz iodine lamps. With all the equipment, diffusers can be used to create a soft light.

special fast meter, and you get what you see. This is particularly useful for lighting reflections in mirrors, glass, or even just glossy paint.

There are various types of tungsten lighting suitable for indoor use. The most common is the high intensity quartz iodine lamp, which is used in professional lighting.

Tungsten lights can be used in daylight for use with colour materials but there is a big loss of output. Blue gelatin filters, or a blue reflector can be used; and some lighting equipment manufacturers supply glass dichroic filters, which are heat resistant. If tungsten lighting has to be used, and it is not practical to convert it to daylight then it may be possible to exclude any daylight from the shot, and work on tungsten film. You may even wait until dark for some shots.

Balancing the light

Even with modelling lights it is hard to get the balance between the daylight and the flash head is going to be. A Polaroid back is invaluable for checking the lighting ratios.

Often there are light fittings, such as chandeliers, which are part of the decoration and should be illuminated. But if they are on for all the exposures they would be overexposed. The solution is to leave them switched on for only half the total exposure.

In exceptional cases where a really massive flash output is needed—in photographing a cathedral nave with a dark roof, for example—blue flashbulbs can be used. A special unit can fire up to four bulbs at once. The bulbs themselves are comparatively expensive and have

Radio City To keep the atmosphere of the place, tungsten lamps were used as the main light source, so that they matched the available room lighting



World of photography

NATIONAL GEOGRAPHIC

With 11,000,000 subscribers, up to 60 photographers and a policy of buying Kodachrome in batches of 30,000 rolls, the 'National Geographic' Magazine has a wide reputation as one of the world's foremost showcases of photography



The photograph above is a black and white reproduction of a photograph taken by Joseph Rock during his two-year stay in Tibet in the mid 1920s. It is one of a series of unique colour photographs taken by Joseph Rock during a two-year stay in Tibet in the mid 1920s. Published in November, 1928, it is one of the earliest colour photographs published in the magazine. The photograph shows a group of people in traditional Tibetan clothing, possibly performing a ritual or dance in a courtyard. The image is a black and white reproduction of a photograph taken by Joseph Rock during his two-year stay in Tibet in the mid 1920s. It is one of a series of unique colour photographs taken by Joseph Rock during a two-year stay in Tibet in the mid 1920s. Published in November, 1928, it is one of the earliest colour photographs published in the magazine.

Dancing demons in a Tibetan lamasery. One of a series of unique colour photographs taken by Joseph Rock during a two year stay in Tibet in the mid 1920s. Published in November, 1928

'I am four' A charming reply to Dean Conger's faltering Russian question. This image was taken on one of Conger's visits to the USSR for his photoessays for Geographic

Portrait of a Chinese man taken by Bruce Dale during a visit to China. Geographic photographers may have to shoot anything from portraits to landscapes



As for the magazine's reputation, it is its consistently high quality of photography—National Geographic developed a visually orientated bias very early in its life and was also the first American magazine to publish colour photographs

This photographic reputation is still maintained and to keep the magazine

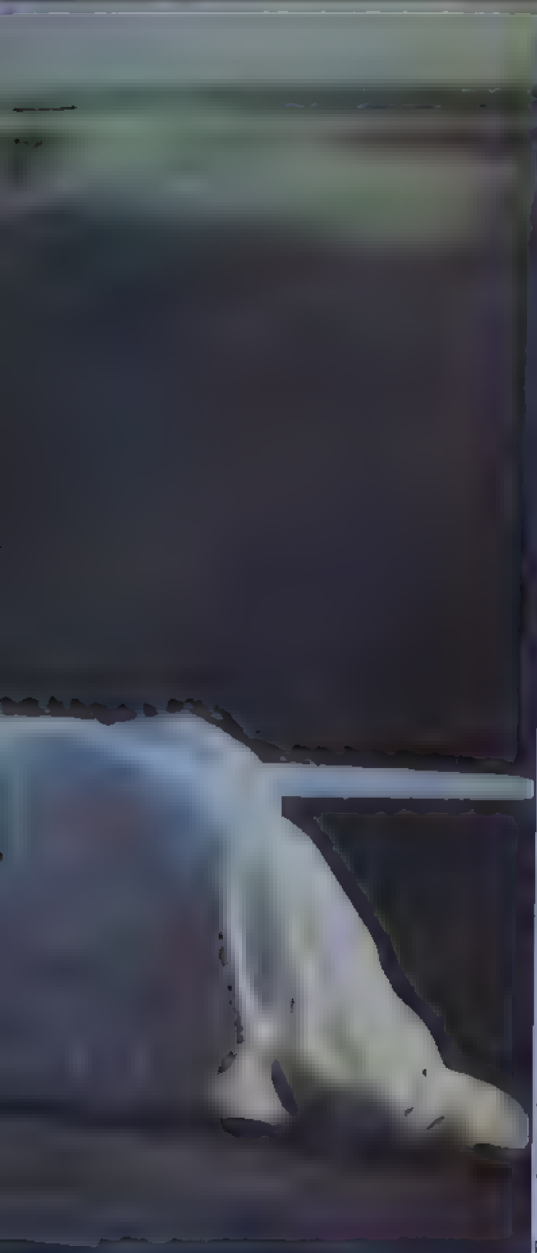
the magazine's reputation for quality photography. The magazine's reputation for quality photography is maintained and to keep the magazine's reputation for quality photography. The magazine's reputation for quality photography is maintained and to keep the magazine's reputation for quality photography.

The magazine's reputation for quality photography is maintained and to keep the magazine's reputation for quality photography. The magazine's reputation for quality photography is maintained and to keep the magazine's reputation for quality photography. The magazine's reputation for quality photography is maintained and to keep the magazine's reputation for quality photography. The magazine's reputation for quality photography is maintained and to keep the magazine's reputation for quality photography.

The magazine's reputation for quality photography is maintained and to keep the magazine's reputation for quality photography. The magazine's reputation for quality photography is maintained and to keep the magazine's reputation for quality photography. The magazine's reputation for quality photography is maintained and to keep the magazine's reputation for quality photography. The magazine's reputation for quality photography is maintained and to keep the magazine's reputation for quality photography.







The mass N_{crit} and $N_{\text{crit}}^{\text{eff}}$ are given by

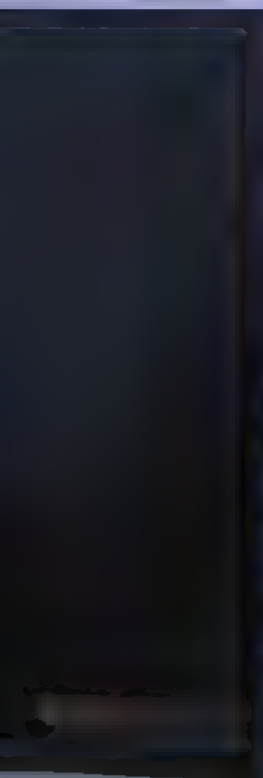
Crop spraying Thomas Nebbia spent many weeks planning this spectacular shot of crop spraying over cotton fields in California

A deadly spray flies into the safety glasses of this cobra's handler and is frozen by Robert Madden's high speed strobe lights

Kayak odyssey *A small group of American and English canoeists paddle by the gates of a Shinto shrine at Itsukushima on Japan's Inland Sea*

culture and speak
different language

Even before going off to the photographs the photographer



Christopher 蕭, Knight/Nat King G...







Dodgers at play

Stanheld took the
prize at the end
of the race but
only realized
afterwards that he
had caught Prince
Philip driving the
tour in-hand

Windsor Park Luck

also helps
Stanheld took the
prize at the end
of the race but
only realized
afterwards that he
had caught Prince
Philip driving the
tour in-hand

Impromptu dance by

Igandan tribesmen
This was one of many
that George Mobley
saw performed on
his travels from
village to village
across the East
African bush





The temple of Bhagwati Karniji Rats cluster round food offered to them as the reincarnations of the ancestors of local people. Lit by electronic flash

photographer re testing James
photographer once hired a

ment by hiring a light plane. He
tioned that he had something to prove
himself. The
be so
photograph
often similar

When it comes to taking the pictures
the high standards of the
gazine put further pressures on the
photographer. Robert Gilka described

graphers are expected to work without
col

light and
an ordinary
subject something special. In this sense,
photographs published in *National*

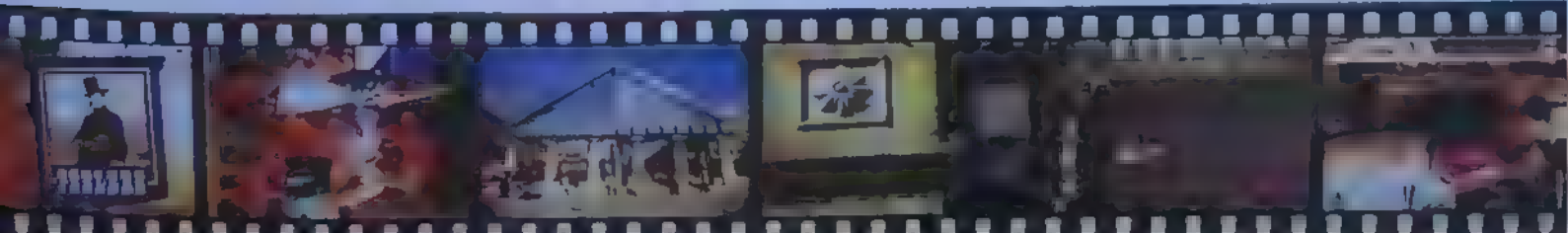
The temple of Bhagwati Karniji Rats cluster round food offered to them as the reincarnations of the ancestors of local people. Lit by electronic flash

A

concerned with maintaining a st

ONE FILM ONLY

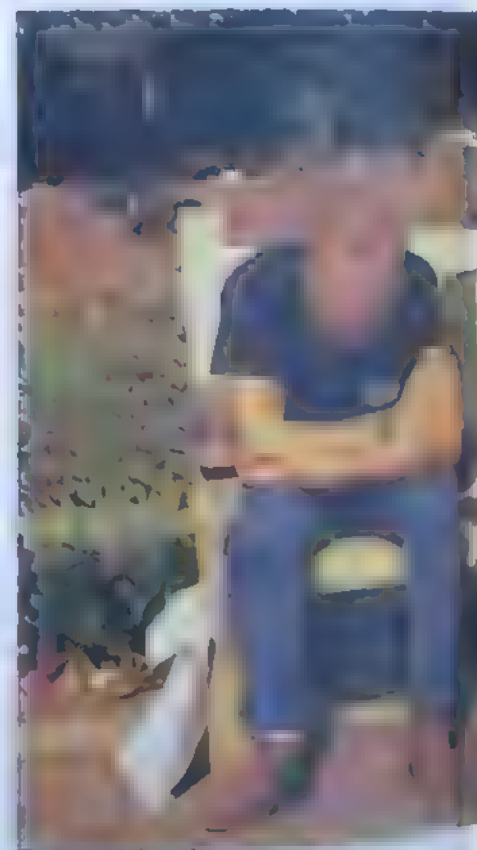
found myself with a few frames left o





Three girls

Three girls standing together outdoors. The girl on the left is wearing a light blue dress and holding a long, thin object. The girl in the middle is wearing a white top and an orange skirt. The girl on the right is wearing a yellow top and a blue skirt. They are standing in front of a red umbrella.





*Sitting down Homer took great care over the composition of each shot to avoid wasting film. Here he framed the image to include the graffiti above the subject. **Fruit and vegetables** A close-up of one of the stalls provided a reminder of what Covent Garden used to be and nicely complemented the candid.*



RAPID COLOUR PRINTS

Colour printing used to be a lengthy process, but now, thanks to two radically different processes, Kodak Ektaflex and Agfachrome-Speed, colour prints can be produced quickly and simply

For the first time in the history of photography, it is now possible to produce a colour print in less than 10 minutes. This is a revolutionary development, and it is the result of two radically different processes, Kodak Ektaflex and Agfachrome-Speed. Both of these processes are designed to produce colour prints quickly and simply, and they are the result of a long and arduous process of research and development. The Ektaflex process is a direct positive process, and it is the result of a long and arduous process of research and development. The Agfachrome-Speed process is a direct negative process, and it is the result of a long and arduous process of research and development. Both of these processes are designed to produce colour prints quickly and simply, and they are the result of a long and arduous process of research and development.

Look at Ektaflex. It is a direct positive process, and it is the result of a long and arduous process of research and development. The Ektaflex process is designed to produce colour prints quickly and simply, and it is the result of a long and arduous process of research and development. The Agfachrome-Speed process is a direct negative process, and it is the result of a long and arduous process of research and development. Both of these processes are designed to produce colour prints quickly and simply, and they are the result of a long and arduous process of research and development.

The Agfachrome-Speed process is a direct negative process, and it is the result of a long and arduous process of research and development. Both of these processes are designed to produce colour prints quickly and simply, and they are the result of a long and arduous process of research and development. The Ektaflex process is a direct positive process, and it is the result of a long and arduous process of research and development. The Agfachrome-Speed process is a direct negative process, and it is the result of a long and arduous process of research and development. Both of these processes are designed to produce colour prints quickly and simply, and they are the result of a long and arduous process of research and development.

Setting up for Ektaflex

The first step in the Ektaflex process is the preparation of the print. This is a simple process, and it is the result of a long and arduous process of research and development. The Ektaflex process is designed to produce colour prints quickly and simply, and it is the result of a long and arduous process of research and development. The Agfachrome-Speed process is a direct negative process, and it is the result of a long and arduous process of research and development. Both of these processes are designed to produce colour prints quickly and simply, and they are the result of a long and arduous process of research and development.



the first step in the Ektaflex process is the preparation of the print. This is a simple process, and it is the result of a long and arduous process of research and development. The Ektaflex process is designed to produce colour prints quickly and simply, and it is the result of a long and arduous process of research and development. The Agfachrome-Speed process is a direct negative process, and it is the result of a long and arduous process of research and development. Both of these processes are designed to produce colour prints quickly and simply, and they are the result of a long and arduous process of research and development.

The Ektaflex process is a direct positive process, and it is the result of a long and arduous process of research and development. The Agfachrome-Speed process is a direct negative process, and it is the result of a long and arduous process of research and development. Both of these processes are designed to produce colour prints quickly and simply, and they are the result of a long and arduous process of research and development.

Ektaflex Compact and fairly simple to use the printmaker is an important part of the Ektaflex system

that is left—perhaps the most important part of the Ektaflex system. The printmaker has to be able to work in the darkroom—this is a very important part of the Ektaflex system. The printmaker has to be able to work in the darkroom—this is a very important part of the Ektaflex system.

It is best to get a good print before you start to work. This is a very important part of the Ektaflex system. The printmaker has to be able to work in the darkroom—this is a very important part of the Ektaflex system. The printmaker has to be able to work in the darkroom—this is a very important part of the Ektaflex system.

Using the Ektaflex printmaker



1 Make sure the lamination rollers are clean and dry before using the printmaker



2 Set the tension bars into the slots behind the rollers



3 Pour the activator solution into the printmaker, taking care to avoid spilling



4 Fill the printmaker to the top of the marker in the top left corner



5 Close the lid, making sure that the tab on the bottom left is correctly set



6 With the tab in place the edge guides are now correctly aligned



7 Fix the ramp to the printmaker and load the paper and exposed film

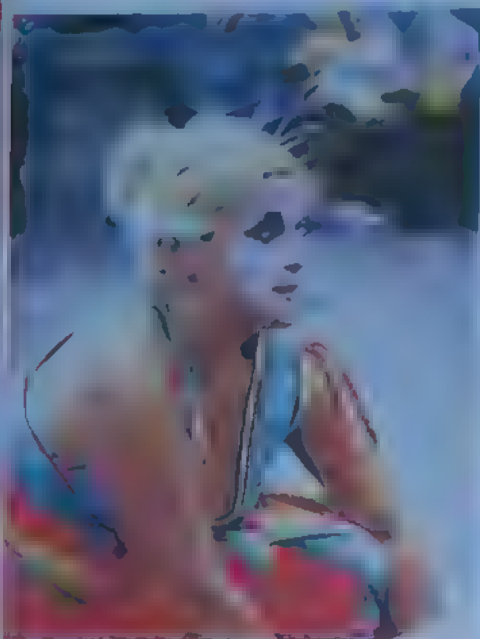


8 Slide the paper down the ramp into the activator solution

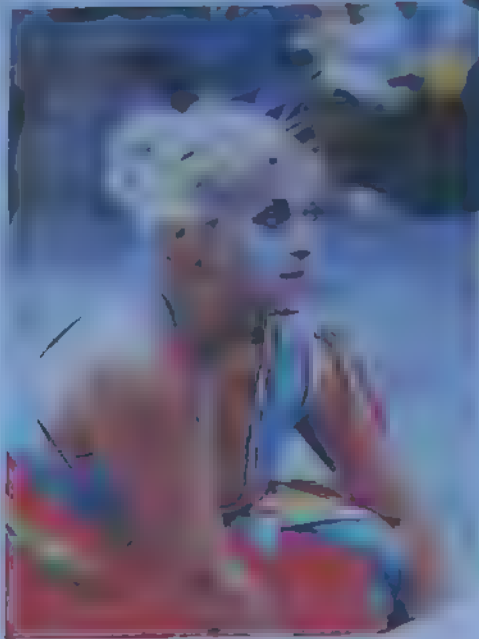


9 After 20 seconds laminate the film and paper through the rollers

Reducing the processing time



Normal This Ektaflex print, taken from a slide, was given the normal suggested development time of 20 seconds and a lamination time of six minutes



Under This print was given a much shorter development time, and although there is a slight loss of contrast the effect is negligible

ward to move—without splashing—if the print size is changed constantly

Next, pour in the special activator solution. This is very caustic alkaline solution and every possible precaution must be taken in the handling of it. Rubber gloves and suitable goggles provide some measure of protection against splashes, but also wear a good covering of old clothes—and work on an easily cleaned surface. Have a towel and wiping cloths to hand to deal with any splashes from the printmaker.

When the printmaker is filled with activator—it takes almost all of the 2.5 litre bottle in which it is supplied—carefully close the cover, and you are ready for printmaking.

Making Ektaflex prints

One rather peculiar characteristic of Ektaflex paper is that it can be handled in normal light—and the first stage of making a print is to remove a sheet from its storage box and place it, grey side up, on the paper shelf on the cover of the printmaker. You can then proceed, in your own time, with the PCT film exposure under normal colour printing conditions—without coming to a frustrating dead-end because you have forgotten to load the printmaker.

You can use the paper in half or full sheet sizes. If you are cutting—which you can do safely in daylight—remember to allow for the fact that the Ektaflex paper must be slightly larger than the PCT film. You rarely get a perfectly registered lamination especially when using smaller sizes of paper for tests. The resulting print may have to be trimmed to a size somewhat

smaller than intended so remember to allow for this when composing the enlargement.

It is best to use a proper trimmer when cutting paper and film to get sheets perfectly rectangular. The film—which looks and feels like paper—has to be cut in darkness so arrange suitable card and tape stops on your trimmer, or make up a cutting board (see page 2315).

Each film sheet is notched on one edge and the emulsion side faces you when this notch is on the right hand side of the topmost edge. When you cut the sheet, use the unmarked part before you forget which is the emulsion side, leaving the marked half in the packet or in a paper safe until required. If you will be using the film within a short time, it will be safe enough to leave it in the box without any further covering, though Kodak warn you not to do this. If you cut but do not use the PCT film straightaway, it is a good idea to clip the appropriate corner so that you can identify the emulsion side later on.

PCT film is exposed in much the same way as normal colour print material using the recommended starting filtration and time (see below). One important difference is that the negative or slide is loaded emulsion side upwards because the image is reversed in lamination.

As the negative or slide is printed upside down you may have trouble with Newton's rings in a carrier with glass—the anti-Newton glass will be on the wrong side. Either use a glassless carrier or swap the carrier glasses around to correct this.

The PCT film's reverse is almost black and clearly visible as such if you

needed to avoid splashing the... and Droplet... be wiped off... thoroughly w... ramp before.

The PCT film... for the recommend... seconds at all normal w... atures—unless you are... This timing is not critical.

When the time is up, the film and paper are levered jointly toward lamination rollers which are rotated at approximately two turns a... action does need practi... in a dry run, to... coordination of the left and right h... movements.

The film and paper emerge from the rollers and should be left for the approved time. This depends on the room and work top temperature... the type of PCT film—it is longer for reversal—but can be as low as eight minutes for normal results. Room lights can now be turned on unless you... run through several other prints.

After the recommended time, you can peel the two apart to reveal the print or the paper half of the sandwich. As with many forms of colour prints, do not make a final assessment of the colours until the paper is dry, when colour saturation and depth of black will have improved.

Exposure, filtration and testing

Ektaflex PCT film has very similar properties to conventional Ektacolor paper and changes in filtration produce very similar results—so there is no need to 'rethink' filter values if you are already familiar with this aspect of colour printing. Starting filtration is recommended on each pack of film and these change from batch to batch just like normal paper. The film is of similar speed also, so instead of using Kodak's suggested—and rather extensive—stop trials prints, try giving exposure times more closely around your usual colour printing times.

For tests, you can separate the sheets sooner than recommended if you wish—just over half the normal time is enough to show the colour balance. Appropriate adjustments can then be made on a more

After use, the activator solution is poured off, via the drain tube, for reuse. The claimed capacity is about 75 full size prints, and the solution should last about a year. Remove the printmaker's fixings to the worktop and lift the unit to get all of the activator out. Then wash and dry the machine.

Possible variations

The system as befits the name Ektaflex is flexible and allows considerable scope for variation. It is worth experimenting to find out the limits of error, but you can also use some effort to control the final result and even to create certain images which would be hard to achieve in any other way.

As mentioned, if you do not laminate for the full time you can assess the colour fairly well—the prints lack saturation but are not rather coloured. By reducing the developing time, however, you reduce the contrast somewhat at the cost of slightly coloured blacks and a slight shift in colour balance. These effects can be exploited to either control the contrast, particularly with a transparency, or to achieve a high key result, especially with a subject which has no dense blacks to spoil the effect. You will have to reduce the development time to as little as five seconds to achieve these effects and it may take practice to run prints through in such a short time.

Small reductions in development time will show very little effect in the finished print and this may be useful if you want to run off a batch of prints quickly. A development time of, say fifteen seconds, gives results which are virtually indistinguishable from those given the recommended time.

It is also possible to use the same negative to laminate a further print. But as there is only a limited amount of dye available in the negative film, the results are again desaturated and pastel, unless the first print was laminated for only a short time. There are difficulties with making a second print. One is that the dyes may seep out of the emulsion into the activator, discolouring it and giving a cast to all subsequent prints. The same thing can happen if you leave the film soaking in the developer for longer than the approved 20 seconds when making prints normally. When making second prints, begin the lamination process immediately so that the used negative spends as little time in the activator as possible.

Another problem is that unless you peel the first print apart in darkness, the negative will be heavily re-exposed and the second print will have a strong cast in the highlights—magenta with negative type film, and yellow with reversal type. Kodak suggest that this effect can be used creatively, and that different colour re-exposing lights could give different results. The reversal material is slower than the negative material, so electronic flash may be necessary to achieve interesting results.

Agfachrome-Speed

Agfa's product, Agfachrome-Speed, has some similarities to Ektaflex, though it is a quite different material. It consists of one sheet instead of two and the movement of dyes from the sensitive layer to the image layer takes place by diffusion through the material, rather than by transfer from one sheet to

another. It must be placed the right way up. B

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

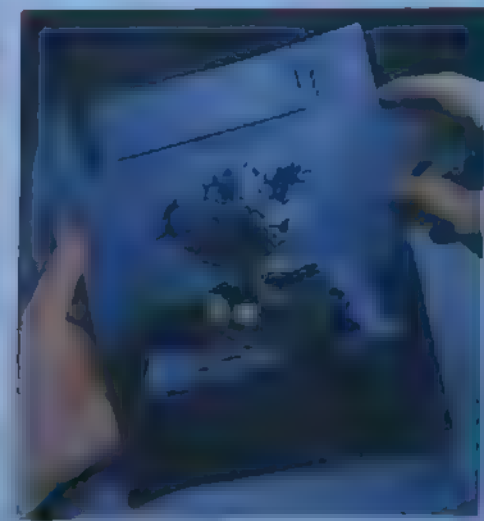
Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed is available in 35mm and 126mm formats for 35mm cameras.

Agfachrome-Speed



Single sheet Unlike other materials this paper is exposed on the back



Results Contrast can be varied by altering the activator solution

Ektachrome processing

When you send a roll of Ektachrome to be processed by a professional D & P lab, the quality is entirely in their hands. But just how well do commercial labs process Ektachrome?

Kodak's E6 colour process, the process used for all modern Ektachromes, will soon become an industry-wide standard. Even Agfa-Gevaert, who long produced films which worked on a system quite different from Kodak's, have recently introduced films which can be processed in E6 chemicals. Because of the widespread popularity of Ektachrome, it is very interesting to look in detail at the film and its processing.

Ektachrome was launched by Kodak in 1946. Prior to this, Kodak's only slide film was Kodachrome, with its complex processing. Ektachrome was really a by-product of Kodacolor, which Kodak produced in order to satisfy a demand from the US Air Force. USAF wanted an air survey film that could be processed on the spot—actually in the war zone. They approached Kodak with the idea of setting up a Kodachrome processing plant on a train, but Eastman Kodak dismissed this as impractical, and instead started work on a film which itself incorporated colour couplers (see page 551), so these need not be carried in the colour developer solutions. This step, they realized, would greatly simplify processing in the field. They came up with Kodacolor, and from this developed Ektachrome.

The Ektachrome process used today is the most recent in a line of Ektachrome processes. Kodak made changes to the original processing cycle, and dubbed this E2. This was followed by E3, E4, and finally E6. With the exception of two specialist films, Photomicrography colour and Ektachrome infrared, which are both E4, all Ektachrome films and most other reversal films use E6 except in the Eastern bloc countries where they use the Agfa System.

At home, Ektachrome is normally processed in a single developing tank, and the tank is drained completely of each solution after every stage of the process. The professional labs, on the other hand, generally use 'dip and dunk' processing machines. On these, the film is loaded into racks or hangers, which are lowered into the solutions, and raised out of them. This means that the bottom end of each roll gets slightly more development than the top, but this rarely makes an appreciable difference to film density. Agitation is by bursts of nitrogen gas, which stir up the developer in a controlled manner.

The other significant differences between amateur and professional processing are largely those of scale. A lab buys and mixes chemicals in much



larger packages, and replenishes solutions, rather than discarding them when they become exhausted. Most labs also run a silver-recovery programme.

The most important practical point for the amateur when choosing a lab is consistency. For this reason, Ektachrome processing should be confined to one lab—chopping and changing will mean that you cannot be sure how dense your film may appear. Each different lab generally sticks to within about half a stop of the processing recommendations, but this means that any two labs may be as much as one stop different. If you use just one lab, you can compensate for their processing by marginally altering the film speed dial on your camera.

These variations between labs are perfectly natural, and since each individual lab usually sticks very closely to its own processing procedure, the results from any single company are generally completely consistent.

The other variations between labs is in image colour. Some labs run warmer or cooler than others. This is a function of the pH of the developer: 1 ml of a 5N concentration of sulphuric acid added to the colour developer (per litre) will reduce the yellow balance by 0.05 density units. Adding 1 ml of 5N Sodium Hydroxide solution per litre increases the yellow balance by the same amount. This control could presumably be exercised over domestic processing, too.

Clip testing and pushing or pulling (see page 1320) are valuable facilities if

Still life All the films processed had a noticeable green cast; the one from which this frame was taken was among the least green of the batch.

you have access to them—remember that if a film is being clip tested, you should specify which end you want clipped. If you fail to do this, the test the most convenient end on this is the leading frame, and on roll the tail—the last frame.

The quality you obtain from a pushed or pulled film does seem to vary partly on the lab. Speed changes can result in changes in the warmth/coolness of the image, and it is possible to control this variation using push/pull changes but not all labs do this.

The tests

You might imagine that the best way to decide which laboratory is the most consistent would be to ask professional photographers, who are frequent and demanding users of colour processing facilities, for their recommendations. But in fact professionals differ widely in their opinions of labs, and one leading photographer, noted for quality, may use a lab which others, also in the top league, would advise you to steer very clear of.

Processing a film is rather like cooking: even the best restaurants have bad days, when things are not up to standard, and it only takes one poor report to give a place a bad name. There is probably no laboratory that has never damaged a film.

For this test, the drums only the range to be found are simply identified by involved 10 laboratories all. They included a leading laboratory in London, which

is machine
slowly

lab regularly includes a K-12

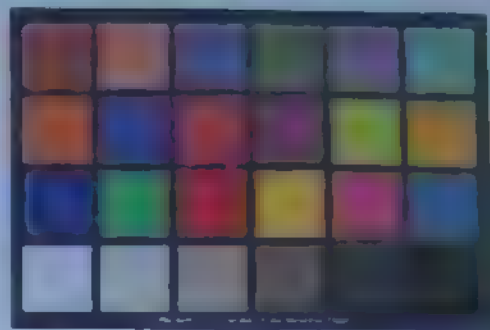
[illegible][illegible]

The equipment used in the tests was made up of two parts: a test rig which had a motor, drive shaft and flywheel, and a test piece which was attached to the flywheel by a belt.

[illegible]

We therefore sent another man to try a different dealer and so it is the time with the dealer of the experience. The dealer was very good and told us that he said that in the past, when he was in the dealer's storage, he stored him. We bought the car in summer from a dealer with a very large turnover and it was exposed and sent for processing within two weeks of purchase suggesting that the dealer's storage was inadequate although they have a refrigerated warehouse.

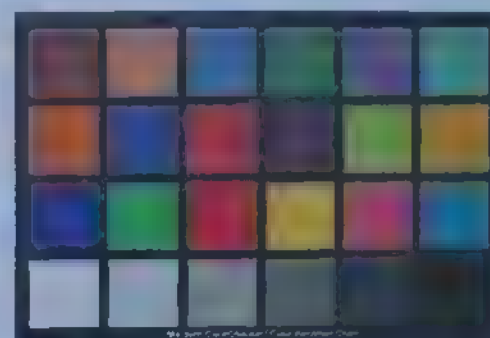
A drying mark, as in the top left hand corner (below), can ruin a picture—especially if on the emulsion side



Typical grey On the Macbeth card, most films gave slightly green neutral density.

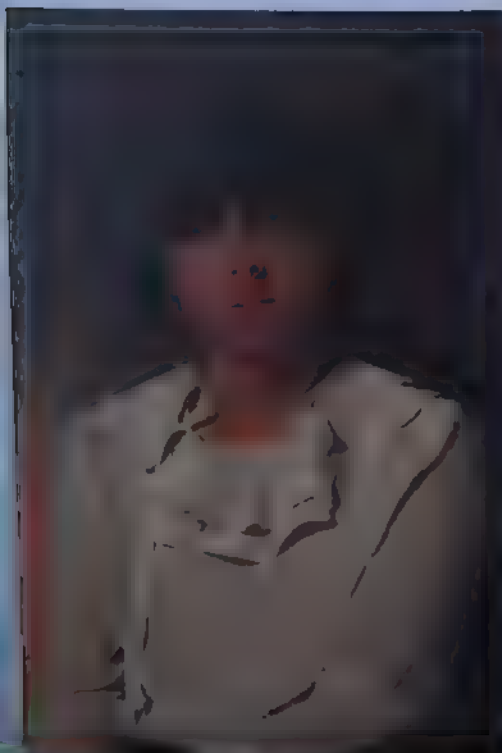


Good grey Only a few of the processed films gave a grey as neutral as this



Poor grey With some films the green cast could be very severe

Ray Duns



Rob: Scaddell





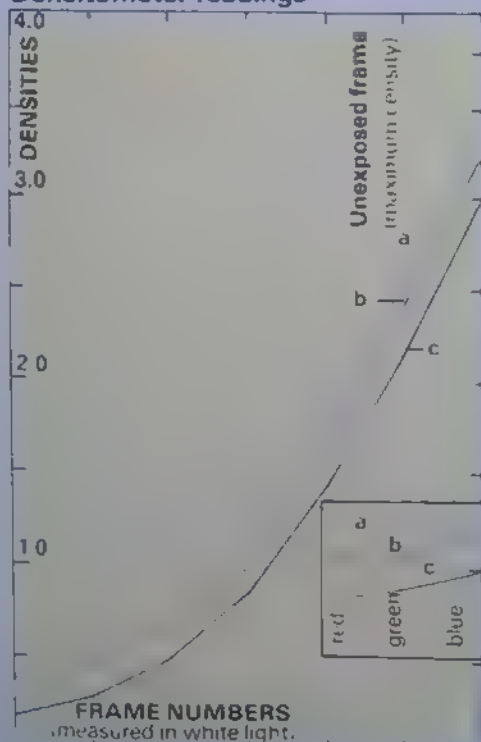
Chemical smudging (above) is not a common fault on Ektachrome film, but when it does occur, it usually ruins the picture completely. Scratches occur commonly and can be a nuisance, but they are due to carelessness after processing rather than the process itself.

The X-ray hazard

Are Ektachrome films susceptible to X-rays? We passed Ektachrome 64 and Ektachrome 400 through an IAL Rapiscan machine of the most modern type, as used in a number of international airports. This gives a much lower X-ray dose than earlier machines. There was no detectable change on either film, despite being passed through the machine ten times.

These results apply only to this particular type of machine, which gives a dose of 0.15 millirads per pass.

Densitometer readings



The graphs (a, b and c) show the densities of each of the six neutral tones (numbered 1 to 6) on the Macbeth card. The boxed curves are of a mud grey frame, measured in red, green and blue light

Kodak claim that Ektachrome is within 100 units of neutral, when released to dealers, and that it is a primary neutral, which is shown by the fact that it eventually goes green. Deterioration can be hastened by storage in poor conditions or by being kept within the plastic tubs in an environment containing vapours such as formaldehyde. Kodak try to avoid releasing film with a green tint, but as the densities are far more affected by blue than by red or green light.

The green tint is never varied considerably from lot to lot, even when the film is stored in the tubs for a long time. When the results were plotted on the graph, the results were compared with a Kodak reference film. The films were found to be very similar, and appeared to be the same. It is significant that the data which produced the green tint result was that they had the proper tint, and the colour balance, per se, rather than in order to prevent their facts and figures from being a tiny which are measured in a Macbeth densitometer. The test therefore suggests that such sensitive strips can be used despite regular colour strips.

At the other end of the scale, two films have been used, the green tint and the results were compared with the reference film. It would seem that had the data been measured in overall green light, the results would have given a different picture. It was the only

failure in the results of the test.

The black frames of the film are also available in a number of different shades, but the lab which sent the film, the 'greenest' cast, to the test, was brown at the other end of the scale. The film had a brown tint, and the black frames were very dark.

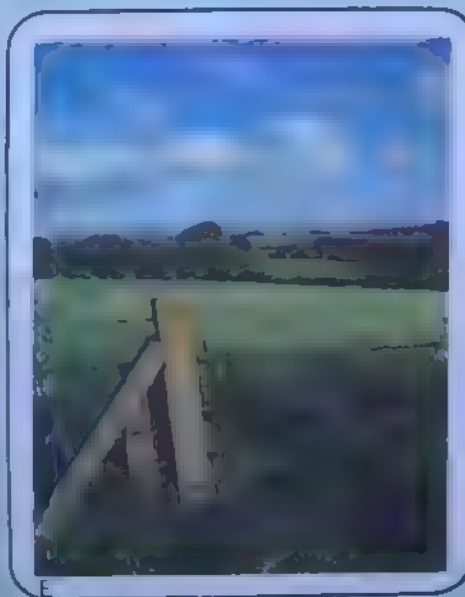
No film was found to be a good 'free' film, in other words, it was not a 'mark'. Most of the films were in a 'brown' and appeared to be a 'side' rather than the 'green' tint. They could be wiped off with a cloth, but the uncommon, however, the film did not show any of the marks of the 'green' tint. Ektachrome film, after it has been processed, shows signs of 'sprinkling' holes, appearing as circular arcs where the film is 'the' 'green' tint. Kodak recommend that machines use temperature control, the star, after which the film is 'the' 'green' tint. They also suggest that the 'green' tint should be kept at a 'green' tint. In other processors there is a 'green' tint, but the 'green' tint is only a 'green' tint, and the 'green' tint is only a 'green' tint, and the 'green' tint is only a 'green' tint.

One favourable point is that the films had similar contrast, and indicating that the process is consistent in this respect. Therefore suggest that by using a lab, and if necessary using filters to avoid any consistent bias in colour, you can get very repeatable results from Ektachrome film.

What went wrong?

JUDGING LANDSCAPES

A critical test of a photo is to compare it with others, as in a competition or magazine selection. We asked four photographers to judge some landscapes



ACEDB
ABDCE
CEABD
ACDBE

the five photographs that were entered in the competition. The judges, who were asked to rank the photos from best to worst, agreed on the top three. John Sims, Ian McKinnell and Colin Molyneux all placed photo A first. The only disagreement concerned photo E. Colin Molyneux, for example, said 'The road leading into the distance is a classical landscape device and is used very effectively here.' They also agreed on the pleasant effect given by the backlighting.

Ian McKinnell put photo C first, commending the composition 'with the rigid, almost mechanical grid created by the tree trunks contrasting well with the chaos of vegetation behind

Homer Sykes placed photo B first, praising the 'soft, hazy light' and the 'low horizon'. He suggested that the photo was 'a good example of the 'landscape' genre, with the excesses of the 'landscape' genre being avoided'.

All of the panelists agreed that the photographs displayed a 'high level of technical competence' and that the competition was 'a good example of the 'landscape' genre'.

The only real disagreement concerned photo E—Homer Sykes and Colin Molyneux put it last but Ian McKinnell placed it second 'simply because of its beautiful colours'. As John Sims concluded 'Taken as a group the entries convince me that landscape photography is much more difficult than most people imagine, particularly for city dwellers'.





NIGHT WATCH

Most people only take photographs when they can see a good picture. At night you may not be able to see the scene at all—but the results can often be very rewarding

Night photography often puts people off because they feel that it is technically difficult. Yet it can offer a whole new world of creative photography—familiar landscapes can be transformed and strange effects otherwise impossible can be created with no more than the standard tools of equipment. You can take spectacular scientific pictures at times when most other photographers have gone to bed.

Photography needs light. But in the absence of the sun you can use tiny exposures in twilight, moonlight and even starlight as well as the whole range of artificial sources, including flash. During twilight the light can take on a subtle coloring, which often records itself in unexpected ways. On a clear evening the main twilight colors is a mixture of blue, violet and red with blue as the overall tint. Clouds taking

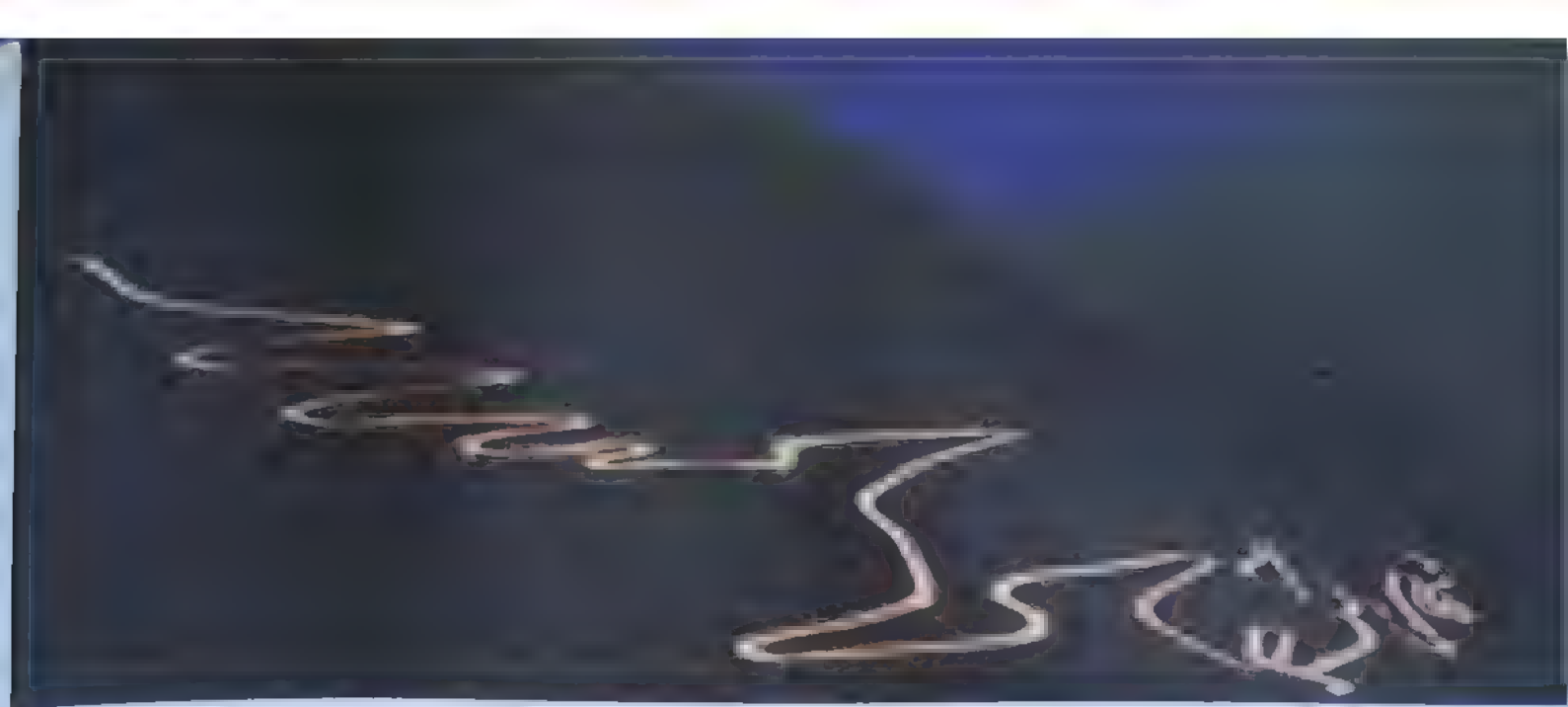
shape in the sky are often silhouetted against the twilight sky. The colors of the sky are often very subtle and can be captured on film with a long exposure. The colors of the sky are often very subtle and can be captured on film with a long exposure. The colors of the sky are often very subtle and can be captured on film with a long exposure.



French Alps

Navaho Lake New Mexico

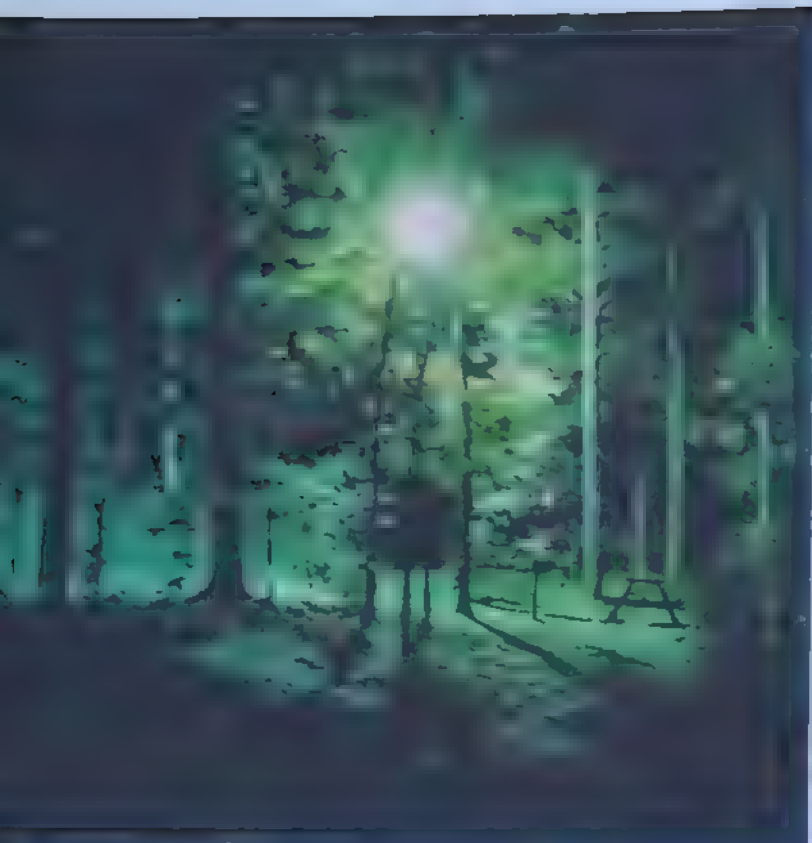




St Gotthard Pass, Switzerland On a dark night, the chunnel can be left open for long periods to dissipate cooling air by reflecting it to trails.

Cusco, Peru Streetlights are colored objects that project light, cast shadows and create a sense of depth and texture.





© Peter D. P. / Getty Images

Trees Artificial light has strange and only partly predictable effects. Mercury vapour lamps, for example, give foliage a weird green glow.

Twilight glow The light changes quickly at dusk, giving a spread of glowing colours. Including the trail of headlights adds impact.

House A rustic night gives a restricted range of delicate colours. A single highlight creates a focal point.

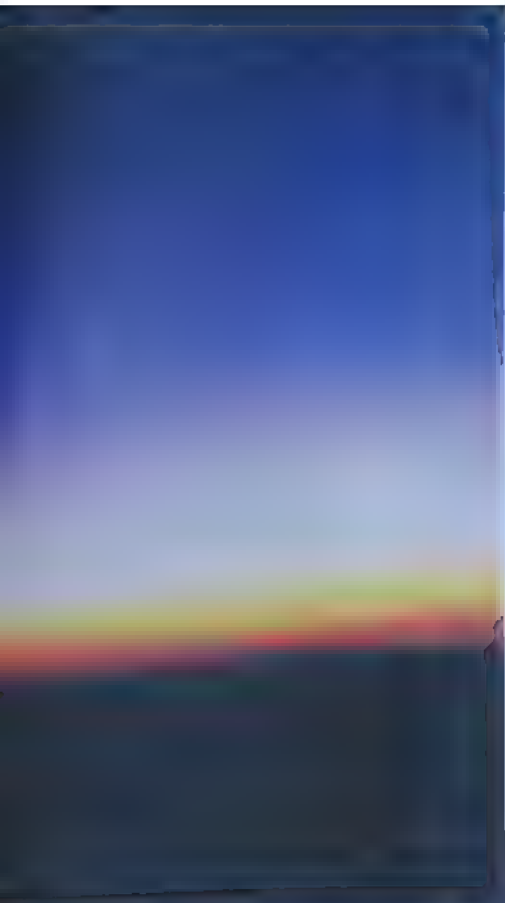


© Peter D. P. / Getty Images

...the light source is a single point, the light rays are parallel and the image is sharp. If the light source is a large area, the light rays are not parallel and the image is blurred. This is why a large light source, such as a window, creates a soft, diffused light. The same principle applies to the human eye. The pupil is a small opening, so light rays entering the eye are parallel and the image is sharp. If the pupil is dilated, the light rays are not parallel and the image is blurred. This is why a person with a dilated pupil has a blurred vision. The same principle applies to the camera. The aperture is a small opening, so light rays entering the camera are parallel and the image is sharp. If the aperture is wide, the light rays are not parallel and the image is blurred. This is why a camera with a wide aperture has a blurred background. The same principle applies to the human eye. The pupil is a small opening, so light rays entering the eye are parallel and the image is sharp. If the pupil is dilated, the light rays are not parallel and the image is blurred. This is why a person with a dilated pupil has a blurred vision. The same principle applies to the camera. The aperture is a small opening, so light rays entering the camera are parallel and the image is sharp. If the aperture is wide, the light rays are not parallel and the image is blurred. This is why a camera with a wide aperture has a blurred background.

...the light source is a single point, the light rays are parallel and the image is sharp. If the light source is a large area, the light rays are not parallel and the image is blurred. This is why a large light source, such as a window, creates a soft, diffused light. The same principle applies to the human eye. The pupil is a small opening, so light rays entering the eye are parallel and the image is sharp. If the pupil is dilated, the light rays are not parallel and the image is blurred. This is why a person with a dilated pupil has a blurred vision. The same principle applies to the camera. The aperture is a small opening, so light rays entering the camera are parallel and the image is sharp. If the aperture is wide, the light rays are not parallel and the image is blurred. This is why a camera with a wide aperture has a blurred background. The same principle applies to the human eye. The pupil is a small opening, so light rays entering the eye are parallel and the image is sharp. If the pupil is dilated, the light rays are not parallel and the image is blurred. This is why a person with a dilated pupil has a blurred vision. The same principle applies to the camera. The aperture is a small opening, so light rays entering the camera are parallel and the image is sharp. If the aperture is wide, the light rays are not parallel and the image is blurred. This is why a camera with a wide aperture has a blurred background.

...the light source is a single point, the light rays are parallel and the image is sharp. If the light source is a large area, the light rays are not parallel and the image is blurred. This is why a large light source, such as a window, creates a soft, diffused light. The same principle applies to the human eye. The pupil is a small opening, so light rays entering the eye are parallel and the image is sharp. If the pupil is dilated, the light rays are not parallel and the image is blurred. This is why a person with a dilated pupil has a blurred vision. The same principle applies to the camera. The aperture is a small opening, so light rays entering the camera are parallel and the image is sharp. If the aperture is wide, the light rays are not parallel and the image is blurred. This is why a camera with a wide aperture has a blurred background. The same principle applies to the human eye. The pupil is a small opening, so light rays entering the eye are parallel and the image is sharp. If the pupil is dilated, the light rays are not parallel and the image is blurred. This is why a person with a dilated pupil has a blurred vision. The same principle applies to the camera. The aperture is a small opening, so light rays entering the camera are parallel and the image is sharp. If the aperture is wide, the light rays are not parallel and the image is blurred. This is why a camera with a wide aperture has a blurred background.



Cotton picking When using artificial light sources, you should ensure that the illuminated areas form an interesting or powerful composition

Chew Valley Lake, Somerset A small aperture gives good sharpness from foreground to infinity but means that a heavy tripod is essential

When using artificial light sources, you should ensure that the illuminated areas form an interesting or powerful composition. This is particularly important when using a small aperture, as the depth of field is increased, and the background is also in focus. A heavy tripod is essential to keep the camera steady during long exposures.

...the light is very soft and even, and the colors are very rich and saturated. The overall effect is very pleasing and the image is very sharp and clear. The light is very soft and even, and the colors are very rich and saturated. The overall effect is very pleasing and the image is very sharp and clear.

...the light is very soft and even, and the colors are very rich and saturated. The overall effect is very pleasing and the image is very sharp and clear. The light is very soft and even, and the colors are very rich and saturated. The overall effect is very pleasing and the image is very sharp and clear.

...the light is very soft and even, and the colors are very rich and saturated. The overall effect is very pleasing and the image is very sharp and clear. The light is very soft and even, and the colors are very rich and saturated. The overall effect is very pleasing and the image is very sharp and clear.

Improve your technique SHOOTING TO SELL

Making money from your pictures may be easier than you think
By taking extra care over technique and choice of subjects you can turn your holiday snapshots into the type of pictures used in brochures, calendars and many other places

Most amateurs take photographs for the pleasure of producing interesting or attractive pictures. But few that given a sufficient incentive, will produce the same quality of work as the professionals.

For example, a professional photographer will take a long exposure of a scene at night, so that the lights of cars and people are recorded as blurs. This is a technique that most amateurs would find difficult to master.

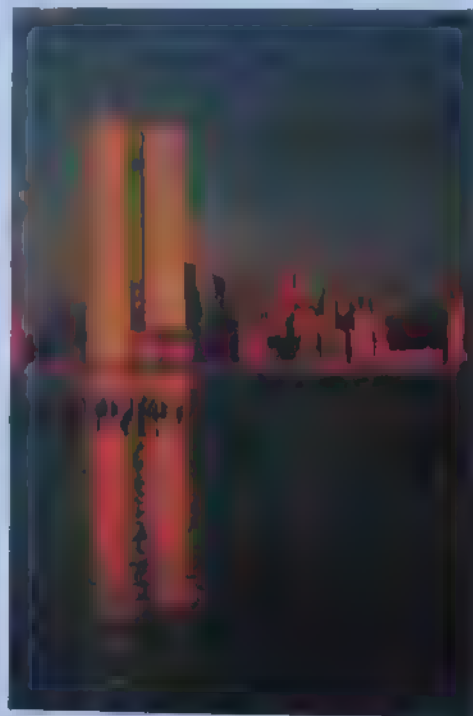
A reason for shooting

It is important to have a reason for shooting. If you are shooting for a specific purpose, such as a brochure or calendar, you will be more likely to produce high quality work. If you are shooting for fun, you may be more likely to produce low quality work. The reason for shooting is also important when it comes to selling your pictures. If you have a specific purpose in mind, you will be more likely to find a buyer for your pictures. If you are shooting for fun, you may have a harder time finding a buyer for your pictures.

There are many libraries throughout the world who are interested in buying pictures. Some are specializing in just one type of picture, such as sport, natural history or travel. Others are more general. It is important to find out what type of pictures they are interested in. You can find out more about these libraries by looking in the *Creative Handbook* and the *Picture Researcher's Handbook*.

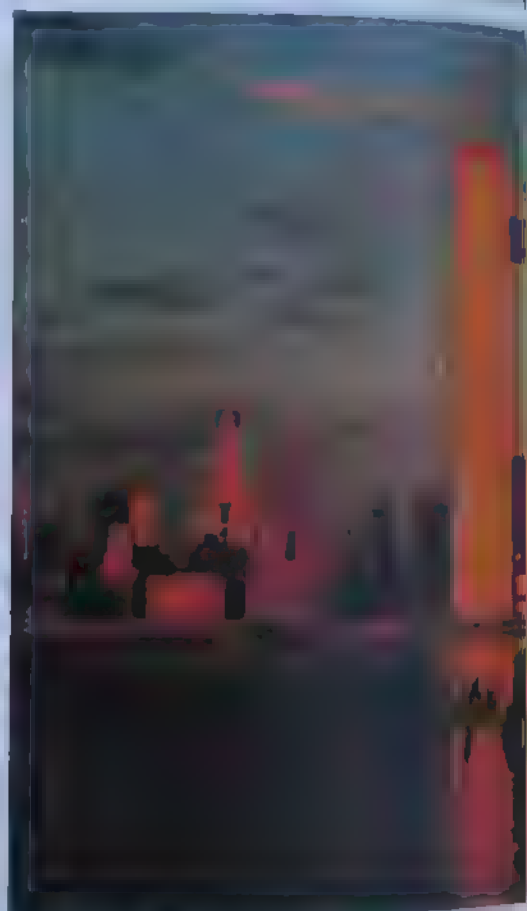
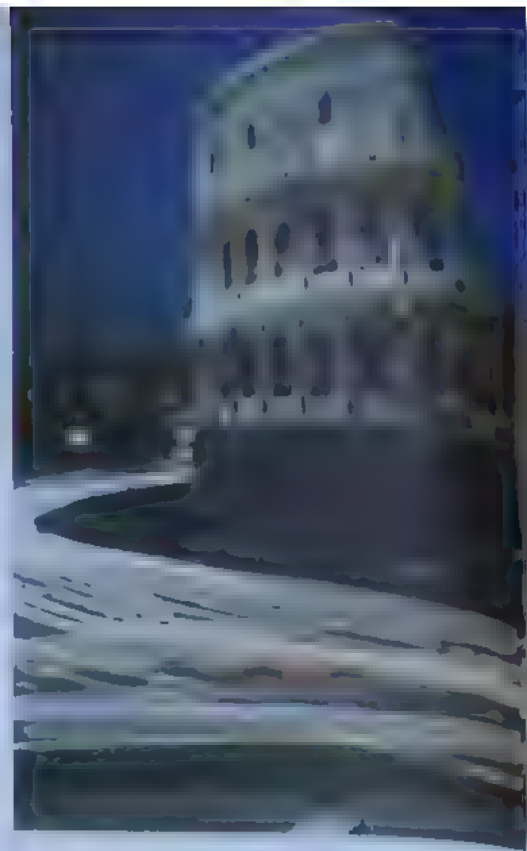
Before sending any shot to a library, ring them or write to them, explaining what sort of work you have and asking if they have any specific requirements. Some of them, especially the larger libraries, demand that you send at least 200 to 400 pictures as a start, and then contribute on a regular basis. However, some accept smaller amounts in any

Colosseum trails By waiting until evening the photographer could use a long exposure, so that the distracting people and cars recorded as blurs



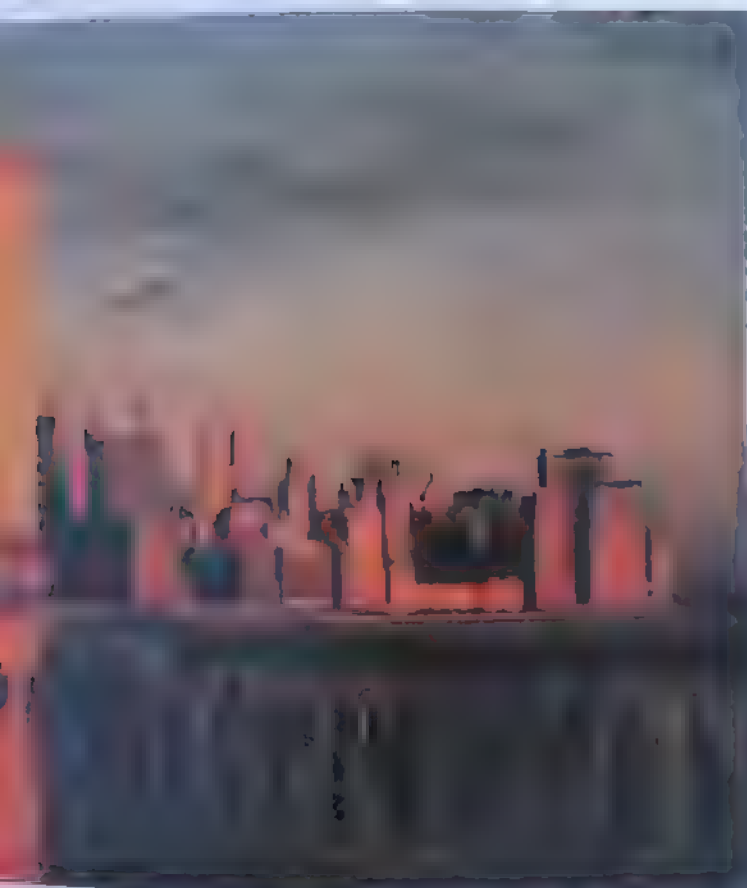
Up and across Shooting a scene both vertically and horizontally allows potential clients to pick the format to suit their requirements. Leaving spaces in the shots may allow text to be dropped in, which also increases saleability

type. Most libraries are interested in high quality work. If you are shooting for a specific purpose, such as a brochure or calendar, you will be more likely to produce high quality work. If you are shooting for fun, you may be more likely to produce low quality work. The reason for shooting is also important when it comes to selling your pictures. If you have a specific purpose in mind, you will be more likely to find a buyer for your pictures. If you are shooting for fun, you may have a harder time finding a buyer for your pictures.



place and any relevant technical details. With natural history photographs, for example, caption details should include the latin name for the animal or plant. Each transparency should be marked with your name. This can be written on the mount (which should be hard) with a pen, but a more professional appearance if you use a specially made rubber stamp.

A professional approach is important in all areas of picture selling. If, in the selection you send to a library, there are



...and you are unprof...
will be reluctant to use yo...
other pictures are quite reasonable.

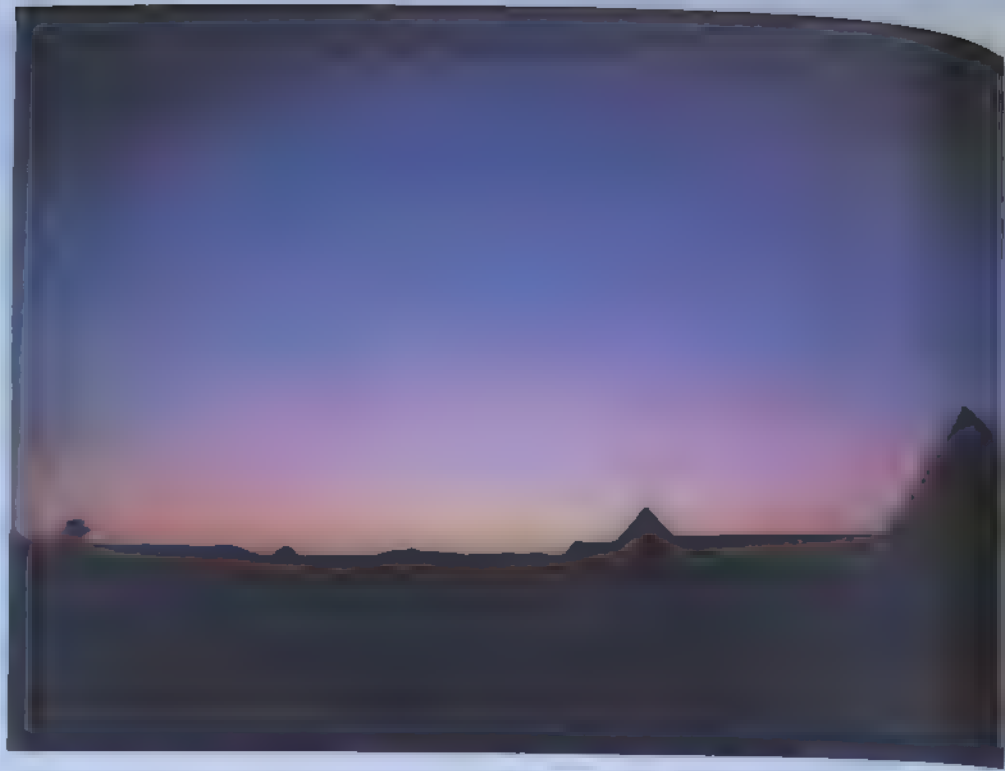
Do not be disheartened if a library rejects your pictures. In addition to any specialization, most libraries have preferences for certain types of picture, and acceptance or rejection can depend on the personal tastes of the person looking at your work. So it is worth trying several different places. Once your shots are

Selling yourself

...new pictures...
...brochure...
...and guide...

Volcano cloud Events of national or world importance, such as the eruption of Mount St Helens, are very worthwhile subjects. Even after the shots have lost their news value they will still be in demand for articles, books and so on, both on Mount St Helens and other related subjects.

Happy families The subject matter does not have to be as dramatic as an exploding volcano. Shots of archetypal people and families also sell well.



Pyramid setting Once you have found a suitable location, you should make sure that you get the most out of it. By shooting a number of different views from a variety of viewpoints at various times of the day, you will end up with a set of photographs that can be used for a whole range of different purposes.

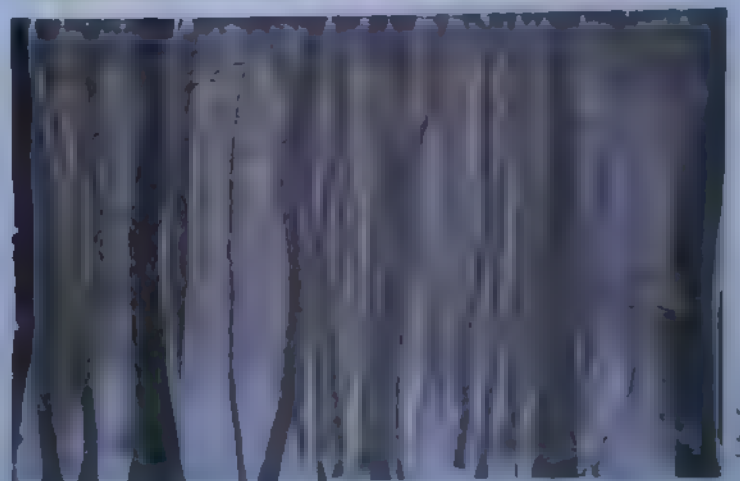
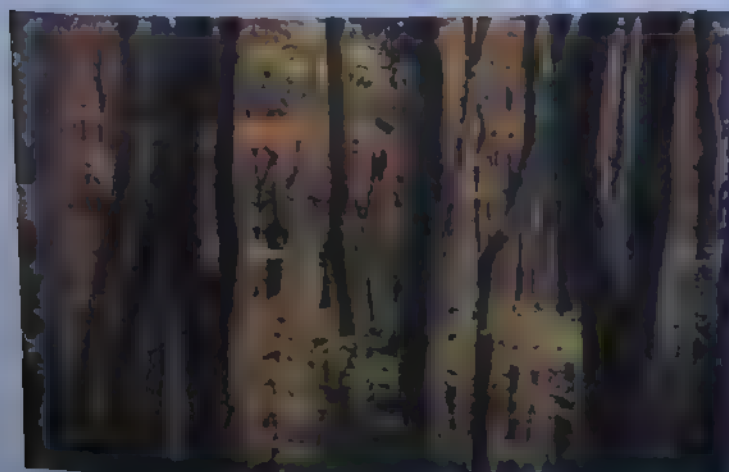
Shooting the shots

for better
shooting a day

to get maps before you go and sunrise while you are there. Check the reports and see the price of any of the places or even

Another valuable resource is to look at the postcards. They vary from very good to awful, but they will give you a good idea of the attractions and viewpoints. You can use as a starting point. The photographers who took the postcards usually know the area well and have plenty of time to find the best location. This means that they have done most of the hard work for you. Using the

Seasoned wood In addition to shooting one subject from a range of viewpoints you can try shooting at different times of the year. Remember to take previous shots with you when you go to reshoot, so that you can get exactly the same composition and viewpoint. Shots like this sell again and again, as singles, pairs or a complete set



KODACHROME PROCESSING

Kodachrome, unlike Ektachrome, cannot be processed at home, due to the complex nature of the cycle. So, once exposed, the results of your photography are out of your hands, and can sometimes be unpredictable

Most photographers would agree that it is hard to find a colour film which gives better colour reproduction and resolution than Kodachrome. Its reputation has remained virtually unchallenged since it was first introduced and because of this it is interesting to see just how well it stands up to critical study—particularly as for many photographers, both amateur and professional, it is as vital a piece of equipment as a camera.

Kodachrome was introduced in April 1935 as a 16 mm movie film, beating its nearest rival Agfacolour, by over a year. It was the first integral tripack (see page 550)—in other words the first colour film of the type we are now used to using, with three separate emulsions—and was an instant success. It was the first colour film to make colour available to everyone, and just over a year later in September 1936 still Kodachrome was introduced.

Compared to a roll of black and white film, still Kodachrome was very cheap when it first appeared especially as the price included Kodak's processing of the film. It was returned from processing in an uncut strip, and it was not until the late 1950s that the 2 x 2 inch slide mounts were introduced. These 2 x 2 inch slide mounts very quickly became an industry standard.

Kodachrome soon became an important part of the Kodak industry. Indeed its popularity has even led to a suggestion that Kodak had an unfair advantage over other firms since it is often hard to find an independent processing laboratory for Kodachrome. Their monopoly of the processing facilities in Britain was investigated by the Monopolies Commission in the 1960s. They acknowledged that the process was very complex, and did not object to the monopoly Kodak offered assistance to any lab wishing to operate the very expensive processing machinery, two of which took up the option. Both of these soon found that the work was very exacting, and dropped out. In the US however, it is a legal requirement that Kodachrome be sold non process-paid, and there are a number of independent laboratories.

Background

Kodachrome differs from all other colour films currently available because it uses a system in which the colour couplers are incorporated into the processing solutions, not in the film itself. All other colour films use couplers built into the film's emulsions (see page 551).

This system has a number of advantages



Colour casts These three Kodachromes show how processing can differ throughout the world. The example at the top shows neutral colours, while the example on the



left, processed in Denmark, has a distinctly magenta cast. The one on the right, however, was processed in Japan and shows a green cast.

and also some disadvantages. From the user's point of view, the greatest advantage is the film's sharpness and freedom from grain. In terms of RMS granularity (an objective measure of how grainy a film is), Kodachrome 64 gives a reading of 10 while Ektachrome 64 gives a reading of 12. The lower the number the less the grain. This is largely explained by the fact that the bulkiness of the colour couplers incorporated in Ektachrome film make the emulsion thicker, and, generally, this film equals good resolution.

The other advantage of Kodachrome is its permanence. On the basis of accelerated ageing tests carried out by Kodak, Kodachrome will last over 100 years in dark storage (20°C, 40 per cent relative humidity) before fading becomes noticeable. Ektachrome, on

the other hand, will last up to 50 years and Vericolor II for only two to five years. The permanence of Kodachrome is of great value to many professionals, whose pictures are their livelihood. They cannot risk their work losing its colour as their stock of images is, in effect, their pension which will earn them money in the future.

One of the disadvantages of Kodachrome is that in most countries only Kodak process the film, although some independent labs, notably in the US, can and do process Kodachrome. The other disadvantage is that Kodachrome is only available in 35 mm, 110 and 126 'amateur' formats (see page 1040). This is a result of the way in which Kodachrome is processed spliced together into long rolls and then fed continuously through the solutions. At one time sheet film Kodachrome was available, known as



One stop under normal processing gives an overall blue cast



One stop over normal gives a stronger green cast



Two stops over normal gives a strong green cast

Kodachrome professional II came in sheets up to 11 x 14 inch, but was withdrawn in 1946 when Ektachrome was introduced.

Kodachrome's 'amateur' tag is easily explained. Kodachrome is used extensively by professionals, but despite suggestions that Kodak should introduce a professional version it is still only available in 'amateur' versions. This could be due to the changes in quality control that would have to be made in manufacture and processing and also to the likelihood that as Ektachrome's characteristics are developed and improved, Kodachrome could eventually be phased out. There are suggestions, however, that a 200 ASA (ISO) Kodachrome may one day become available.

Processing

Early Kodachrome had an immensely complex cycle which involved the diffusion of a viscous bleach solution through the emulsion layer. The film had to be washed and dried three times in the course of processing, and not surprisingly, there were numerous problems, with processed films sometimes coming out blue, magenta or green.

The early processing was done in a dark room, and the film was exposed to light through a mask. The film was then developed in a series of baths, including a bleach bath, a fixer bath, and a wash bath. The film was then dried and the final image was visible.

The middle years of Kodachrome processing saw the introduction of a new method, which involved the use of a single bath for development and fixation. This was a significant improvement, as it reduced the risk of contamination and the time taken to process the film. The film was then washed and dried, and the final image was visible.

The middle years of Kodachrome processing also saw the introduction of a new method, which involved the use of a single bath for development and fixation. This was a significant improvement, as it reduced the risk of contamination and the time taken to process the film. The film was then washed and dried, and the final image was visible.

By the late 1940s, Kodachrome processing had become a standard part of the photographic process. The film was now available in a range of formats, and the processing cycle had been simplified to a single bath for development and fixation. This made Kodachrome more accessible to amateur photographers.

Problems with Kodachrome

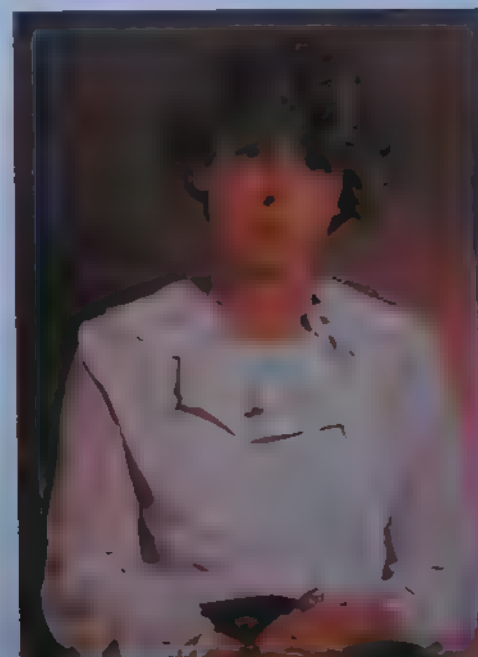
Even today, Kodachrome is known for its high degree of accuracy and colour rendering. However, it is also known for its tendency to show faults in processing or manufacture. Those who use nothing but Kodachrome are bound to complain at every fault, even though they may find the results of other films even worse. There are, however, a few faults which are particularly noticeable in the film.

A major source of complaint is blue streaks. These are usually cyan and appear as a pale blue streak across the frame. They are caused by a variety of processing faults which can account for these and for the wider blue streak which sometimes occurs. Magenta patches and dark streaks are also found from time to time.

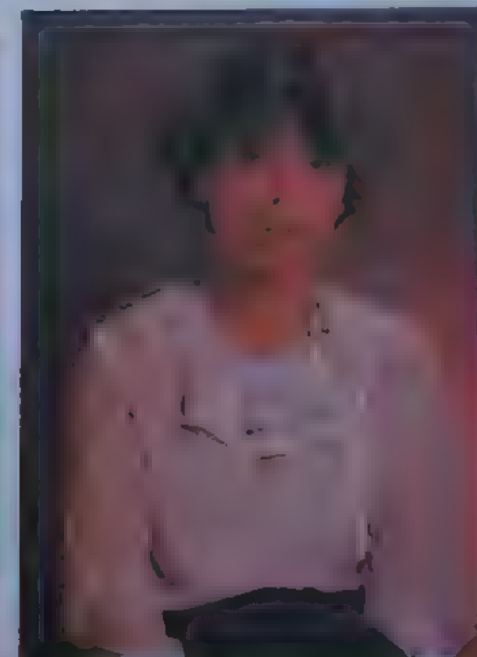
One fault which is particularly noticeable to Kodak is the presence of pale areas you may find pale areas



Normal This film was exposed before the recommended expiry date



Six years old Even in refrigerated storage outdated film shows a red cast



Three years old Kept at room temperature the effect is more noticeable

streaks across the film. Kodak say these are caused by pressure on the film, and blame the photographer for winding too aggressively or for rewinding the film the wrong way round in the cassette. Practised photographers prefer to blame Kodak, particularly if the fault only occurs on one film.

If you examine the film side of a processed Kodachrome you may notice that it has a burnished appearance. Fine streaks visible if you catch a reflection off the surface. This is a result of the removal of the black backing during processing, but only rarely are these scuffing marks objectionable.

As a result of these defects many photographers will try to take more than one frame of each shot, with no change in camera settings, in case one is spoiled by defects. Kodak will respond sympathetically to courteous letters pointing out the faults, and if you return a particularly badly damaged film they will usually replace it—though neither they nor any other manufacturer or laboratory will enter into negotiations as to how much compensation they might pay for any shot that was damaged.

It is very important to Kodak to return the film end bearing the identification number stamped through. This tells them when the film was processed, and may help track down a fault.

You will, however, receive little sympathy from Kodak if you complain of damage to frames at the beginning or

Streaks can sometimes occur in Kodachrome processing. In this case they are visible at the edge of the film

end of the film. These are used for splicing on to other films and you cannot expect them to be kept clean. Most people find that they get between 37 and 39 frames from a 36 exposure roll, but there is no guarantee that the end frames will be clean. Kodak even warn that you may damage your camera if you try to wind to the end of a film, and the least that can happen is that the film may tear away from the spool, leaving you with a camera full of film that can only be unwound into a tangled mess.

It is true to say that Kodachrome processed like any other film, with light and patches. If there are any dark areas in the film, they are not to be taken off in colour, but are separated by a few days.

Even with Kodak's own laboratories there are various ways of sending the film for processing. Some Kodachrome is sold process paid, and some process unpaid. The film itself is identified on the edge markings, and the mailers given with process paid film are simply used to make life easier for you and for Kodak. If you lose one, you can still send the film off, but there will inevitably be an additional delay as the film is handled separately.

Most people send their films by post to their nearest processing plant, and receive them back by post. Photographic dealers within a reasonable van drive of the plant may offer a pick up service, using Kodak's own delivery van,

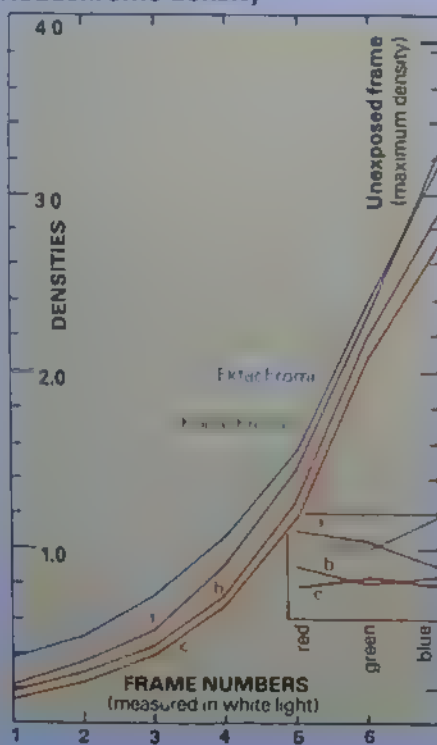
and the films may either be returned to you by post or by collection from your dealer. The latter method is usually quicker than normal, and has the advantage that the postal service is not involved. You should not put an address on the mailer if you want the film to go back to the shop, but put your name on as a precaution. Kodak do not charge the dealers, but dealers may charge a small handling charge.

You may also hand your film in at the plant itself, and either have it returned to you or held for collection by special arrangement. There is also an urgent service, with restricted availability. If you attempt to get Kodak to process your film urgently, you will probably be told that their fastest service is reserved for 'police and fire services'—though how many police and fire services insist on using Kodachrome rather than Ektachrome, which can be processed virtually anywhere, is uncertain. Even professional photographers have been told that they cannot have their material processed quickly because if they were a professional they would be using Ektachrome!

Using Kodachrome

Like all amateur colour films, a roll of Kodachrome is expected to change its characteristics as it ages on the shelf before exposure and processing. Factory-fresh film actually has a greenish cast, which ages through neutral to magenta by its expiry date. None of these casts should be more than 10% of the total colour cast, which means, however, that a new film and an

Kodachrome density



This graph shows the densities of Kodachromes processed in a—Canada, b—Australia and c—South Africa, compared to an average Ektachrome

Orientalisms

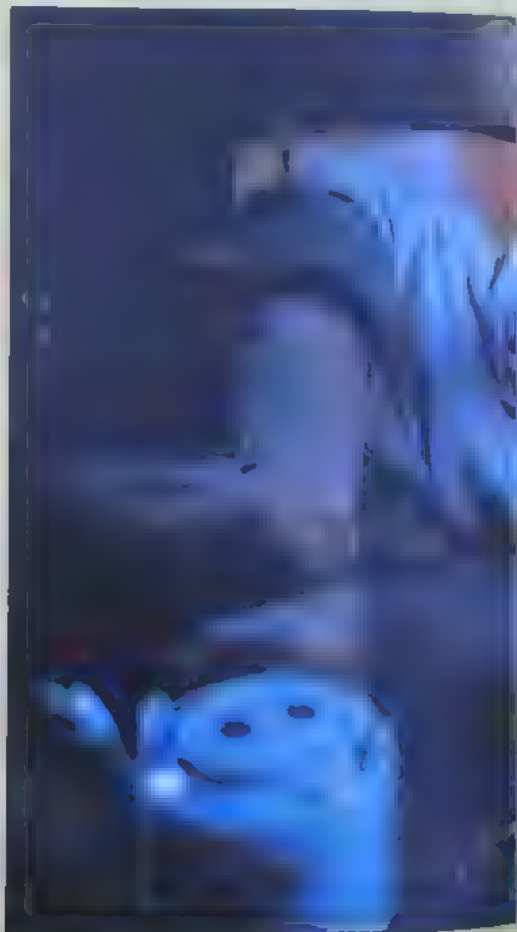
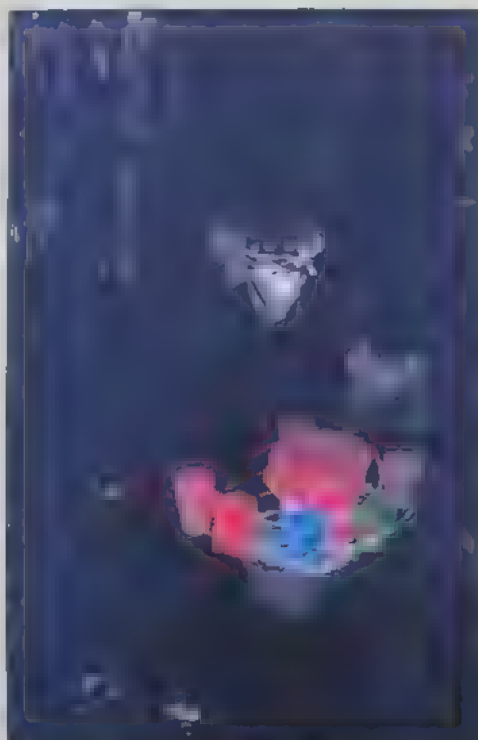
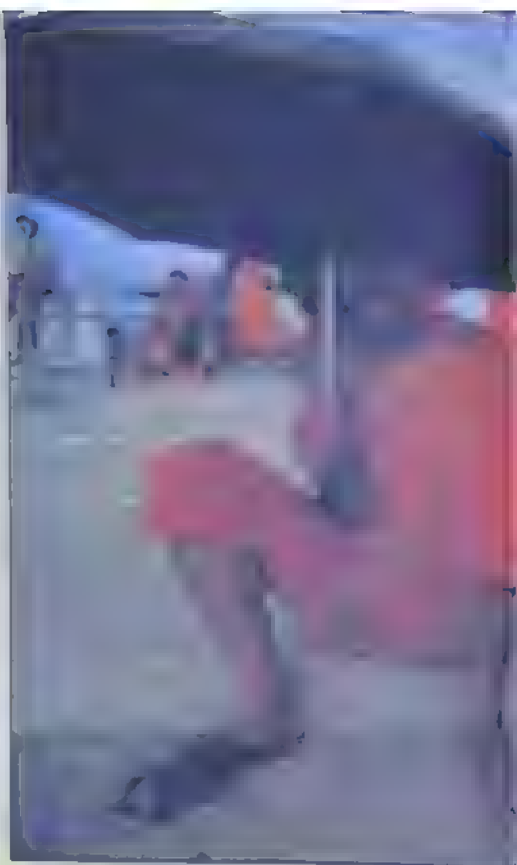
Tim Page's assignment, self-imposed and open ended, is to record the spirit of South East Asia on film. To succeed, he feels, he must go through a process of 'reorientation'—learning to live the life before trying to record it

grapher has much greater freedom

Monks The incongruity of umbrellas and robes is captured in this simple and muted double portrait of semi-shod Laotian monks

Water seller Religious merit is won by adding gold leaf or paint to a Buddha in the temple. Young boys raise money for the gold by selling water to crowds at religious festivals

Robes Monks' robes drying on a rail make a simple composition in saffron



Opium Deliberate underexposure conveys the gloom of the backstreet opium dens where elderly Laotians smoke away an emaciated half-life

lenses from 18 mm to 600 mm. Leica slung permanently round! In early days, the Leica was trademark and, as Tim explains, feel naked without it.

While always working in colour, Tim



1975-1976

PRESENTING YOUR PRINTS

Good presentation, whether for display or storage purposes, will not only give your prints an added sparkle, but may also protect them from long term damage.

Mounting



Showpiece When presenting your prints it is important to choose a method suited to your individual requirements. Framing and glazing (1), flush framing (2) and block mounting (8) are ideal for presenting prints of any size for display in exhibitions or at home, while the plastic cube (4), resin moulding (5) and the peg block frame (6) are best suited to smaller prints for home display.

For storage or for portfolio presentation a simple window mat (3) may be sufficient, but pressure sealed (9) or heat sealed lamination (10) provide better protection. For special presentation effect prints may benefit from distorting glazing (7) or canvas mounting (11) gives a textured effect similar to that of a painting.

not make one yourself, provide a mat about 60 mm interior depth should be matted prints. If you make your own mounted prints easily.

Protection in plastic

The most effective and professional ways of protecting any flat artwork or printed material—is to seal them within plastic. This is called *lamination* and there are two methods, using pressure sensitive or

photograph are special heat or bonded to the. The lamination temperature two minutes—so heatsealing mounting press. Matt textured

Pressure sealed lamination



Size up the roll of laminate with the print, allowing for a slight excess

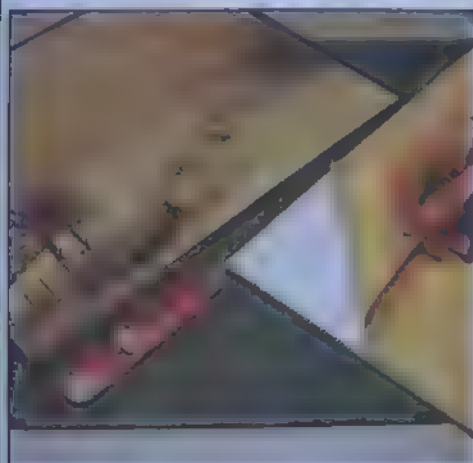


To avoid air bubbles apply the laminate inch by inch from one end

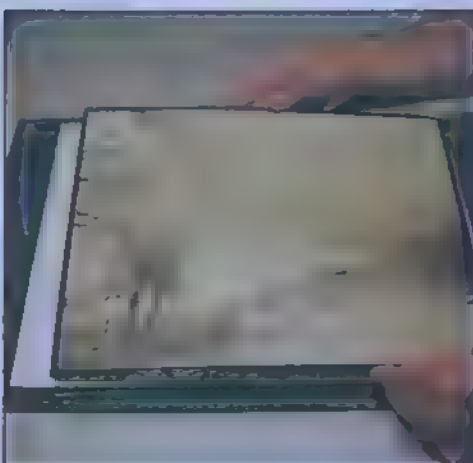


Use a sharp modelling knife to trim off excess laminate

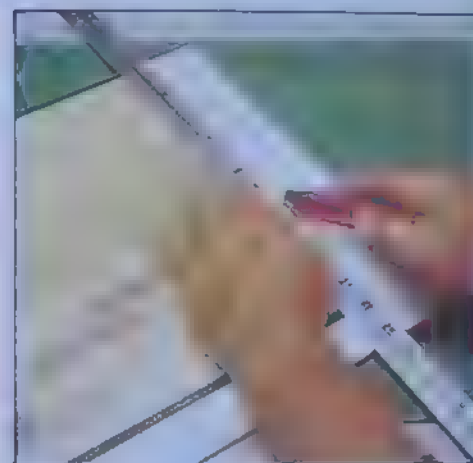
Block mounting on polystyrene



Blocks such as this are self-adhesive and covered with a backing paper on one side



Make sure the print is laid down flat on to the polystyrene block



Use a metal straight edge and a modelling knife to trim off excess

glossy forms of the material, are available.

Pressure sensitive PVC and polyester film can be applied without special equipment and is therefore a more practical proposition for the average amateur. The material is thin and not very strong by itself but it provides a plastic coating that protects the print well. It can be used only with mounted prints.

To use this type of film, cut a piece from the supply roll, rather larger than the mounted print. After cleaning off the print and mount surface, use a perfectly dry, lint-free and antistatic cloth—peel off sufficient backing paper to tack the leading edge of the film to the table.

Butt the mount into the 'V' formed by the table and the underside of the film, carefully lifting the backing paper in order not to expose too much of the tacky side which—by now—tenderly holds the mount.

When you are sure the mount and film are correctly aligned, smooth down the

Resin mould



Embedding a print or transparency in resin allows a wide scope for novel ideas. String can also be embedded into the mould to hang up the result

film in a direction straight away from the 'hinge' where the film sticks to the table. Do this carefully in order not to trap air bubbles or stretch the film. When the film has 'taken' along the edge of the mount, pull at the free edge of the backing paper to expose a little more of the adhesive side and rub this down as before. Continue in this sequence until the print and mount have been covered. Finally, use a fresh support sheet to turn the laminate off the table.

If you desire a finished piece with limitations, as suggested in the text, adjust the top edge of the mounted backing paper to pass through the rollers. Smooth the film down to the mount edge, as before, then at the free of the table. Feed the starting edge into the rollers, ensuring that the backing paper is not under tension. As the print is fed through the rollers, the backing paper as you do so.

Canvas mounting

Canvas mounting is a variation of

the technique used to mount a print. The technique can be used only with PC prints and involves sandwiching special heatseal film and the print together under heat and pressure between a top overlay foil and beneath a release paper and a carrier board. After bonding the heatsealed PC emulsion is stripped from its backing and subsequently drymounted on canvas.

Very full instructions are given with the product (Ademco) and you can get your prints mounted in this way by specialist photo processing labs if you feel dry mounting skills are beyond you.

Embedded photographs

If the idea of mounting photographs in plastic appeals to you, consider sandwiching a picture between thick inflexible sheets—and even blocks of acrylic. Acrylic sheets and blocks can be bonded together almost invisibly—and certainly permanently—using special solvents. Really novel ways of showing off your work can be produced in this way. A variation is to embed photographs in lumps of acrylic to produce key fobs and freestanding displays. You can use opaline printing material or make the print in opalised acrylic. Acrylic bedding kits can be obtained from hobby and model shops, but you can try glaziers or plastic specialists for acrylic sheet, tubes and solvent adhesives.

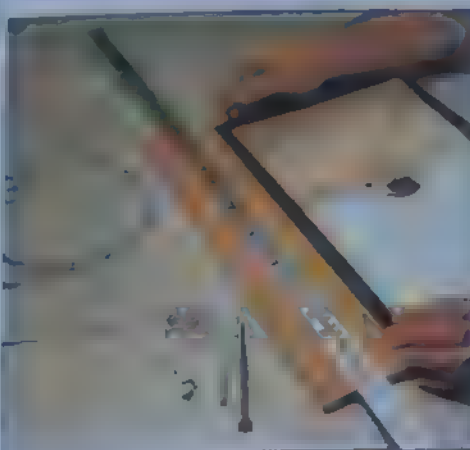
Patterned sheet acrylic can be used in appropriate circumstances, in place of plain plastic or glass to cover a mounted print. Not all pictures benefit from the optical distortions created, but this is something you can experiment with—many firms provide a range of samples. But certain patterns do transform an image into a 'living' abstract whose exact characteristics may change according to the print viewing distance and angle among other things.

Framed prints

Having your favourite photos professionally framed and glazed can be costly—so if your carpentry and craft skills are up to it, you may be able to do it yourself. If you have little experience of handcraft, it would be better to buy a frame kit—some require only the insertion of the print and the glazing is done for you. Some kits are designed to be used with a print that is left unprinted. It is a good idea to remember that a picture that is allowed to hang and be seen in the open air will be subject to the effects of the glass of your frame, so the print should be properly sealed.

The finished size of your frame depends on the size of print and whether you want a mat. A mat is a piece of paper that is placed between the print and the frame to protect the print.

Flush framing



Trim the wooden block mount to the same size as the print



Secure block, print and glass by screwing clips into edge of frame

Making a window mat

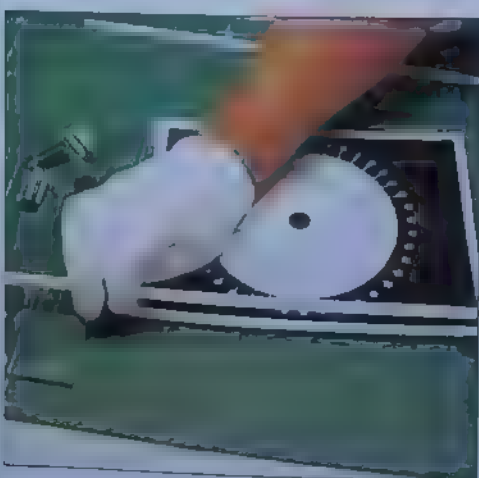


Mark the position of the window lightly in pencil, allowing for a slight overlap

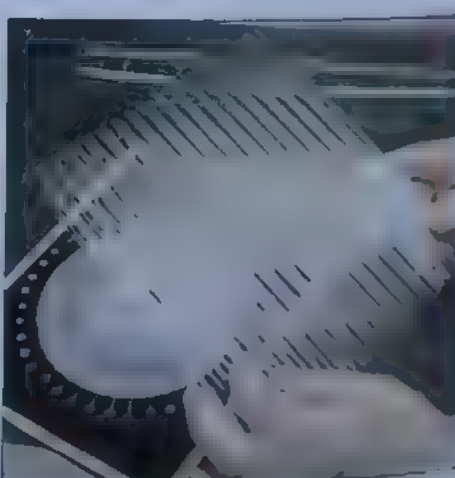


Cutting at an angle away from you will give a bevelled edge to the window

Glass distortion frame



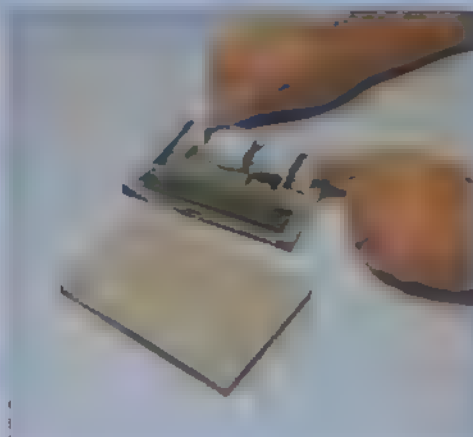
Abstracts can often benefit from being glazed with ribbed or textured acrylic. The acrylic can be attached to the border of the mounted print



Most firms can supply you with samples of various textures, and by setting these against your print you can decide which will give you the best result

Plastic peg-block frame

Simple frames such as these are ideal for mounting small prints



If you wish to remove the print the two halves of the frame are easily separated

Framing and glazing

Choosing a suitable mat is important when framing and glazing a print



Tape the back of the frame to give added protection against dust and moisture

graph equal to half the width of the print. The two side borders can measure the same, but try and increase the bottom border by up to half again. For example, with a print width of 200 mm the top and side borders can be 100 mm and the bottom border 120 mm to 150 mm. From this you can calculate the overmat size.

The colour and texture of the mat is as important as size, shape and its area relative to your print area. You should also consider whether to add 'coach work' lines around the print to define its border. Dry transfer rules can be used to good effect here.

You can use two methods to cut out the aperture in the overmat, one using a knife—the other using a commercial mat cutter. To give your print a professional finish you can set the cutter to make bevelled cuts.

Interesting surrounds can be made by using more than one mat. Using two colours of the same board thickness is called a double mat—the underlying mat is to fit the print while the top mat has

a larger aperture for 'framing' the mat and print beneath. A variation is to make the underlying mat of paper. To be even more elaborate, you can use three cards and make a triple mat. Oval, heart or diamond shaped mats can also be used to very good effect.

Constructing a frame

The type of moulding you select for your frame depends upon the harmony or contrast you desire between the frame, print and also the type of mat which has been used. The frame is very much a personal choice. There are few basic rules but avoid over embellishment. A simple frame in no way detracts from the picture. Different styles of mould are available commercially in wood, plastic or metal. When estimating the length of mould you need, add extra for mitres and allow for trim. It is better to estimate generously than to be short.

The outside edge of the overmat must slip loosely into the rebate of your constructed frame, so cut your moulding

to fit the print while the top mat has a larger aperture for 'framing' the mat and print beneath. A variation is to make the underlying mat of paper. To be even more elaborate, you can use three cards and make a triple mat. Oval, heart or diamond shaped mats can also be used to very good effect.

The type of moulding you select for your frame depends upon the harmony or contrast you desire between the frame, print and also the type of mat which has been used. The frame is very much a personal choice. There are few basic rules but avoid over embellishment. A simple frame in no way detracts from the picture. Different styles of mould are available commercially in wood, plastic or metal. When estimating the length of mould you need, add extra for mitres and allow for trim. It is better to estimate generously than to be short.

Your print can be mounted directly to card or just pasted on to a backing card. The first is to position the print on the back of the same mat and stick the two together with strips of double sided tape to the print. For the second method, cut a piece of hardboard cut to the same size as the mat and mount so it fits snugly behind the frame.

Finally, dust your mat and print. Taking care not to mark it, use a soft brush to remove any dust. Then, using a soft brush, apply a thin layer of clear varnish to the mat and print. Lay a short length of paper down one length of the frame. Apply a slight pressure to the hardboard then press the wood using gentle hammer. The pin head from the wood approximates. Repeat this on the opposite bottom of the frame to the hardboard. Add extra pins where you think necessary.

Finally, cut four lengths of gumstrip using the frame as a measure. Cut a V shape at each corner to give you a neat finish. Moisten one strip with water then lay it along the frame back, sealing the pin heads and hardboard edge. Repeat this on the other three sides. This is an effective dust and moisture seal around

X-RAYS

Everyone knows about the use of X-ray photography in medicine. But it is this industry, reveals the secrets of old paintings and archaeology and opens up many areas previously impenetrable to the human eye.

...range radiation. The same stuff and the process developed into radiography — photography by means of X-rays—which has become more important to the modern world than Röntgen could ever have imagined.

X-rays, like light, are a form of electromagnetic radiation (see pages 198-199). But their wavelengths are much shorter than visible light, extending from 0.0001 mm to as short as 0.0000001 mm. The penetrating power of X-rays, though, varies over this range.

Long wavelength X-rays (also called soft X-rays) are easily absorbed. Shorter wavelength X-rays (hard X-rays) have more energy and are more penetrating. At their shortest wavelength, X-rays will easily pass through more than 0.5 m of steel. It is because X-rays can pass right through some, but not all, materials which appear opaque that X-ray photography works.

Long wavelength X-rays (also called soft X-rays) are easily absorbed. Shorter wavelength X-rays (hard X-rays) have more energy and are more penetrating. At their shortest wavelength, X-rays will easily pass through more than 0.5 m of steel. It is because X-rays can pass right through some, but not all, materials which appear opaque that X-ray photography works.

Producing X-rays

X-rays are produced by accelerating a stream of electrons with metal, glass or some other material. All this activity takes place in a tube.

An X-ray tube is rather like an ordinary tungsten lamp. A glass envelope surrounds a filament which becomes incandescent when current is passed through it.

However, the filament, with household lamps and here, in an X-ray tube, there is in addition to the filament a metal target (often high melting point tungsten) which attracts electrons from the heated filament when a high



Dr. G. F. Leedale/Biophoto Associates

voltage is applied to the tube. The higher the voltage, the greater the speed of the electrons and the shorter the wavelength of X-rays produced. When the electrons hit the target, most of their energy is turned into heat, but some becomes X-rays.

100,000 volts or more may be involved in the operation of some of the more powerful X-ray machines. Such powerful machines must usually be housed in rooms 10 m high and with walls 4 m thick.

The much less powerful machines used for medical examinations do not need quite as much protection but they are nevertheless housed in special areas.

X-ray films

At a casual glance, X-ray film is similar to conventional film—only in bigger sheets. Indeed, ordinary film is sensitive to X-rays. But there are some important differences.

For a start, most X-ray films are coated on both sides. This double coating provides more X-ray stopping power and therefore greater speed, while still keeping the emission layer thin enough for even processing uniformly.

All X-ray films are sensitive to light as well as X-rays. Some are intended for direct X-rays, for use in industrial applications, and have very slow emulsions.

Indigestion? X-rays can reveal fractures, cancers even. Here, a collection of household items swallowed by a patient and lodged in the intestine.

Some are used with intensifying screens which convert X-rays into light. Such screens intensify the X-ray exposure, so that less X-ray is needed to produce the effect.

Screens are used in medical radiography and in industrial applications. They are made of various materials, including lead, which is very effective at stopping X-rays.

energy source. They should be stored X-ray tubes that would otherwise reduce efficiency. However, the screen also have another contribution to make. High energy X-rays actually cause the lead foil to emit electrons and secondary radiation, thus adding to the effect of X-ray exposure.

Use of X-ray photography
Strictly speaking, an X-ray photograph is a negative. It is actually the shadow graph of objects opaque to X-rays placed between the beam of X-rays and the sensitive film that records its presence.

Radiography, as this process is called, introduced something quite unique to the investigative world. Until the discovery of X-rays no one could see inside opaque objects without destroying them. Now, non-destructive investigation, it is so well established that technology and medicine could hardly function without it.

Medicine

Perhaps the most commonplace use of X-rays is in the radiographs produced in hospitals all over the world. By means of radiography, it is possible to carry out a thorough investigation of various aspects of the body painlessly, efficiently and swiftly. Bone fractures or diseases are clearly visible on the X-ray plate. The state of internal organs such as the heart, lungs and kidneys can be checked for problems without the need for surgery. The stomach and digestive system can be investigated by having the patient drink a solution of X-ray opaque barium sulphate. Commonest of all, perhaps, is the X-raying of teeth, allowing the dentist to uncover hidden problems or to discover the extent of visible ones.

Industry

Every ship that is built has to go through a thorough X-ray scrutiny test before it is launched. Such a procedure test the millions of joints, welds and plates in a modern hull, probing for imperfections so that they can be rectified before causing serious problems. Similar checks are made on aircraft, both while they are built and then periodically as part of the regular



servicing procedure. Again these aim to reveal flaws in joints or riveted areas and to spot stress.

Specialized uses

Radiography has numerous applications in the worlds of art and archaeology. Art restorers can use it to establish the internal structure of a piece of sculpture, gaining vital knowledge of its hidden strengths and weaknesses before attempting restoration. Paintings can be

examined to see whether they hide great works over which they have been painted. Plans and sketches can sometimes be discovered under famous works of art, giving some idea of the way they were constructed.

Similarly, archaeologists can use the power of X-ray to make the investigation and disintering of Egyptian mummies less of a task in the dark, or to find out more about how stone aged men lived—and how he died.

Mummy X-ray examination has revealed important evidence of the lifespans, causes of death and genealogy of mummies. It can even be used to trace trade routes by analyzing the clothing and establishing its origins.

Key An X-ray photograph of this iron key, found at a medieval site in London, reveals its shape despite extensive rust. X-rays can also provide information on how an object was made, how it should be cleaned—even an obscured trademark.



PHOTOGRAPHY IN JAPAN



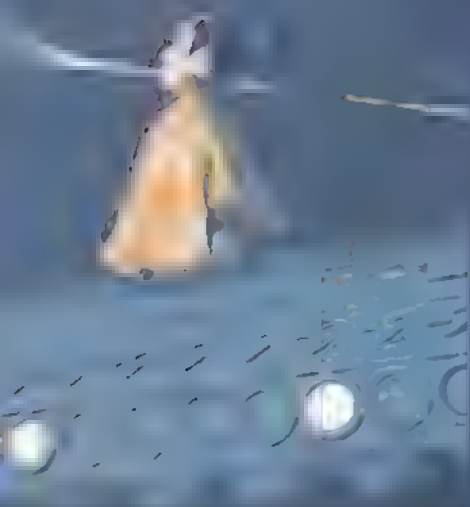
Although relatively unknown in the rest of the world, Japanese photography has developed a rich and varied tradition of imagery based on a unique cultural style



Shigeo Fujimura/Tapestry of Dreams

The enigma One is a series of exotic and erotic images that Fujimura took for his book *Tapestry of Dreams* in the 1970s

The Japanese
Emperor's portrait in
the book 'The
Emperor's
Portrait' by
the artist 'The
Emperor's
Portrait'.



Wade's dream-like, surrealistic figure from
Fujimura's book:
Figures of Dreams

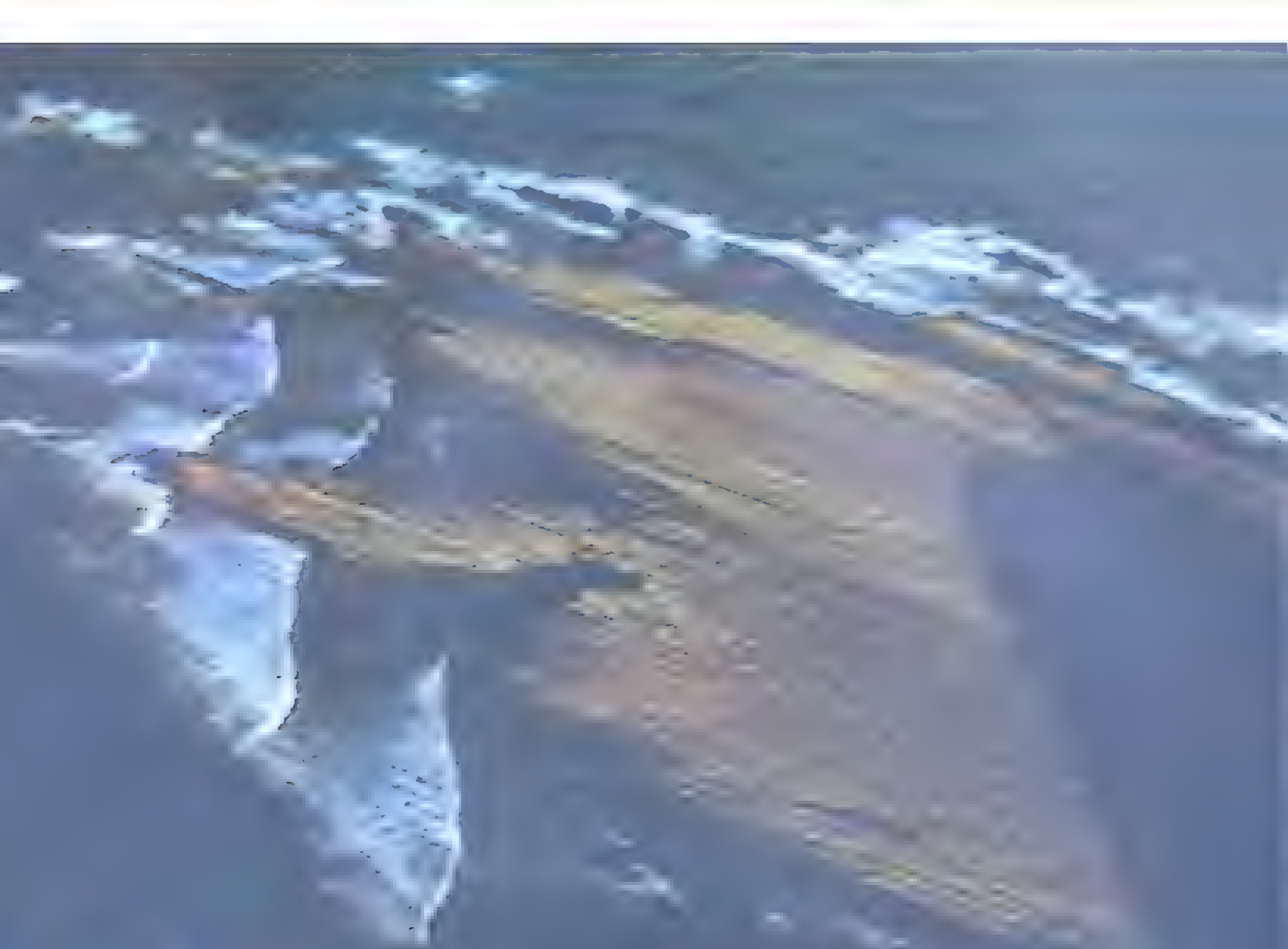


Kakuhō's style: An example of Sakai's
humorous approach, this image is to
celebrate the Panamanian trouser pants.

White Flower: One of the images from
Yoshino Chik's book exploring the
feelings of Japanese women







Waves crashing onto the beach from the ocean, creating a white foam against the dark sand.

The beach is a mix of light and dark sand, with the waves creating a white foam against the dark sand.

The waves are breaking onto the beach, creating a white foam against the dark sand.

The waves are breaking onto the beach, creating a white foam against the dark sand.

The waves are breaking onto the beach, creating a white foam against the dark sand.



PHOTOGRAPHY IN JAPAN

Japan has been the world leader in the production of photographic equipment for two decades now. Names like Nikon, Canon and Olympus are synonymous in most photographers' minds with the highest standards of design and technical excellence. But although photographers everywhere—both professional and amateur—use Japanese cameras, Japanese photography is largely unknown outside Japan.

The boom in the photographic industry occurred simultaneously with the rapid development of industry after World War 2. Nowadays Japan is widely recognized as a highly developed country with a thriving economy, a high standard of living and a fascination for modern technology. However, it also has an ancient and unique culture that has traditionally put great emphasis on art and design. And, despite Western influences, these traditions were long ago carried over into that most modern of art forms—photography. Indeed Japanese photography has a history almost as old as photography itself.

The first daguerreotype camera probably arrived in Japan in the mid-1840s, just a few years after Daguerre published the instructions for the process. It was bought by Ueno Toshinjo, a merchant and amateur photographer by profession, who had been ordered to obtain this fascinating new process by the Lord of Satsuma and Governor of Kagoshima, Shimazu Nariakira. Shimazu was thus Japan's first patron of photography and in 1851 he established what was, in effect, Japan's first school of photography.

From this modest beginning, the practice of photography and the photographic industry have grown enormously. Today there are over 10,000,000

**Today there are over
10,000,000 photographers in
Japan and each year its
factories produce 5,000,000
35 mm cameras and lenses**

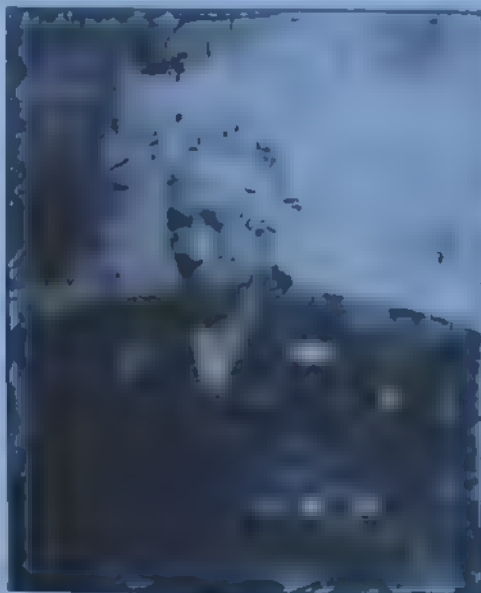
photographers in Japan and each year its factories produce 5,000,000 35 mm cameras and lenses. Picture-taking has become so popular that when steam-train enthusiasts recently arranged a special nostalgic train journey from Tokyo to Yokohama—a mere three kilometres—300,000 photographers lined the track to photograph the event!

In the middle of the last century, however, photography in Japan had a very uncertain future. From 1640 to 1853, during the Tokugawa Shogunate, Japan had deliberately cut itself off from the

rest of the world. Only the Dutch were permitted to trade with Japan, and they were confined to the tiny island of Dejima, visited by Dutch ships which brought a trickle of Western goods, including Nikon's cameras, at the time.

The Western powers, especially the United States, put so much pressure on Japan to lift her restrictions on trade that, at the start of the Meiji period in 1868, the country's new ruler felt obliged to adopt a policy of industrialization and Westernization. Nevertheless for some time photography remained a hobby for the rich. This was partly because poorer people were suspicious that the strange black and white images captured a piece of their soul, and their likenesses, but mostly because photography was extremely expensive.

In order to encourage the development of their own industry, very heavy taxes were placed on all imports. When the aspiring photographer, Kikuma Ueno, decided to open a studio, he bought a Dallmeyer camera, paid for in gold, the equivalent today of the price of a new family saloon car.



Shimazu Nariakira 1857 A daguerreotype of Japan's first patron of photography

Despite the cost of photography, interest in it spread. Portraiture became particularly popular and, by the beginning of this century, there was already a fledgling photographic industry. Then, at about the same time, two things happened that helped to shape the future of photography in Japan.

The first was the rise in importance of the military. Japan had always had a powerful warrior caste, but the code of the Samurai was based on individual skills and loyalties and was quite out of place in an age of Maxim machine guns and heavy artillery. The Japanese government was well aware of how easily the European powers had colonized the rest of Asia and were determined that they would not suffer the same fate. So by 1894 not only did Japan have a modern army and navy on the European model, but she was also engaged in a colonial war of her

own. Fighting with China, Japan's photography was born. It was a tradition continued only ten years later when Japan went to war again, this time with Russia. Eleven photographers were dispatched to cover the fighting, a total of nearly 5,000 pictures were taken. From then on, until after World War 2, the military had a strong influence on Japanese society and consequently on the role of photography in Japan. In time, however, photography began to develop as a distinct art form.

When Kikuma Ueno decided to open a studio, his Dallmeyer camera, paid for in gold, cost the equivalent today of the price of a new family saloon car

graphic industry.

Meanwhile quite different influences were also at work. Many Japanese photographers had travelled or lived abroad, so not surprisingly their pictures tended to follow contemporary European and American movements in photography, especially the soft, impressionistic effects of pictorialism (see page 1504).

Foremost among these early artists was Shinzo Fukuhara, a gifted amateur who had studied for six years in the United States and Germany. But Fukuhara was not content simply to imitate Western photographers and preferred to adapt pictorialism to his own, particularly Japanese style. Fukuhara compared his photographs to *haiku*, the traditional 17 syllable poems greatly admired by all Japanese for their ability to conjure up a place and a mood with the utmost economy.

The gentle photographic poems of Fukuhara and the grisly pictures of war photographers seem to be worlds apart, and the history of Japanese photography does often appear to be split into two distinct camps. On the one hand there was a firm, unflinching documentary style and, on the other, the creation of an elaborate fantasy world. However, the two sides are brought together by the traditional Japanese view of art as a personal, intuitive statement about reality rather than a straightforward description of it. Several contemporary Japanese photographers have happily alternated from one camp to another, doing hard hitting reportage work one year and exotic fashion photography the next.

Between the two world wars, however, it was documentary photography that had the upper hand. In those years amateur and professional photographers both made tremendous leaps forward. The 1914-1918 war had given a big boost to the Japanese economy and greatly raised the living standards of the middle

[illegible][illegible][illegible]

1. *Chlorophyll a* and *Chlorophyll b* were determined by the method of Arar and Collins (1971).

... it was easy for the two opposing themes of Japanese photography—realism and fantasy—to live together in harmony

[illegible]

The period immediately after the war was one of struggle and hardship . . . it is hardly surprising that documentary photography was again the dominant theme

[illegible][illegible]

[The following section contains faint, illegible handwritten notes.]

Woman photographed in Paris, 1914 by Fukuhara showing the pictorialist influence



For both Japanese photographers, but such activities were dominated by the authoritarianism of the 1930s to 1940s. Photographers returned to photography as a joyous expression of freedom and a string of high

Apart from a few best-selling photographs of women in Japanese photography, the Japanese Julia Margaret Cameron and Margaret Bourke-White. Japanese society is extremely patriarchal by tradition. Even today equality of the sexes exists far more in name than it does in practice and, although in 1971 a women's photographic association was formed only occasionally does a woman's name appear in the ranks of Japanese photographers.

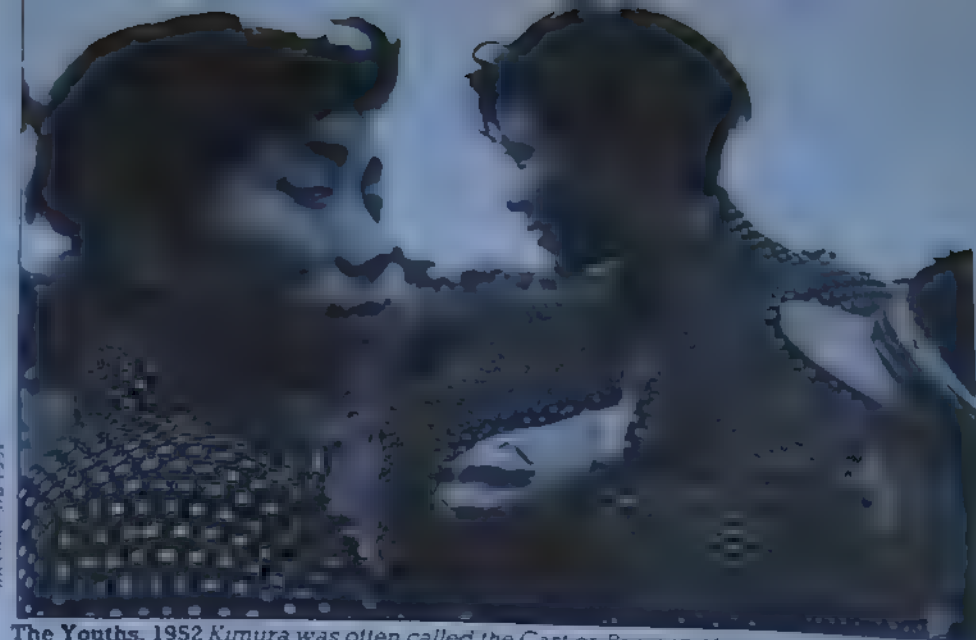
A recent exception is Yoshino Oishi, who combines in her work the two great opposites of Japanese photography. Of

The ability to combine two, or more, very different photographic roles is far more common in Japan than in many other countries

her two major works, one is a book of documentary photographs taken in Cambodia between 1975 and 1978. This deals with that country's attempts to rebuild itself after the years of chaos and massacre under the Pol Pot regime. The other is totally different—a collection of expressive images called *Silent Flowers* which explores the traditional feelings of Japanese women.

The ability to combine two or more very different photographic roles is far more common in Japan than in many other countries. One of Japan's most famous photographers, Kishin Shinoyama, also demonstrates this ability. Using every format from 35 mm to 5 x 4 and every lens from extreme wide angle to extreme telephoto, Shinoyama has covered an astonishing range of assignments. His photographs include gritty black and white reportage work on the tattoo parlours of downtown Yokohama, glossy travel pictures for the Australian airline Qantas, and poetic atmospheric photographs for a limited edition book on traditional Japanese houses, copies of which sold for £600.

Perhaps the most outstanding of contemporary Japanese photographers is Hiroshi Hamaya, who first started as a freelance photojournalist in 1937. Hamaya's work ranges over a wide variety of subjects, but his favourite themes are Japanese folklore and the relationship between man and nature. Although most of his work has been photojournalism—he joined Magnum in 1960—Hamaya's work has also been in a large number of books and exhibitions.



The Youths, 1952 Kimura was often called the Carter Bresson of Japan

and he illustrates the ability to combine two different roles artist and photojournalist.

Equally important in developing photography are the fashion photographers. As far as serious photographers gathered momentum during the 1920s and 30s, the effects of Western culture spread into the home market, and much of it, anywhere else, and the result is a fashion photography 'new' style. This was a new style for many Japanese photographers who, even today, the traditions of photographic family were particularly suited to this kind of photography.

Of all Japanese fashion photographers, probably the most widely respected and the most original is Hiro Wakabayashi (Yasuhiko). He was brought up in Japan in the 30s and 40s. Like many of his generation he was strongly influenced by the American way of life which had been imported into his homeland by the Allied Occupation Forces.

The magazine industry in Japan is complemented by a thriving book publishing industry, renowned for the high quality of its photographic reproductions

after World War 2. At the age of 23 he left Tokyo to study photography in New York, where he soon became Richard Avedon's assistant. But Hiro never forgot his Japanese background and his fashion work is full of the subtle fantasies, sometimes amusing, sometimes disturbing, always highly creative, that are characteristic of the best in Japanese photography.

For younger photographers too, the American experience exercises a deep attraction. Although Japan today is economically one of the world's most powerful nations, she still has strong cultural and emotional links with the United States as well as some healthy

trade connections. In the 1950s a new generation of photographers emerged, many of whom were influenced by the American style. They were not just imitators but innovators, and their work was often more expressive than that of the older generation. They were also more aware of the social and political issues of the time, and their work was often more critical and more powerful than that of the older generation.

In Japan, the book publishing industry is also very strong, and it has been a major force in the development of Japanese photography. Many of the most important Japanese photographers have published books, and these books have often been highly successful. This is a testament to the high quality of Japanese photographic reproductions, which are often as good as the original.

The book publishing industry in Japan is also very strong, and it has been a major force in the development of Japanese photography. Many of the most important Japanese photographers have published books, and these books have often been highly successful. This is a testament to the high quality of Japanese photographic reproductions, which are often as good as the original.

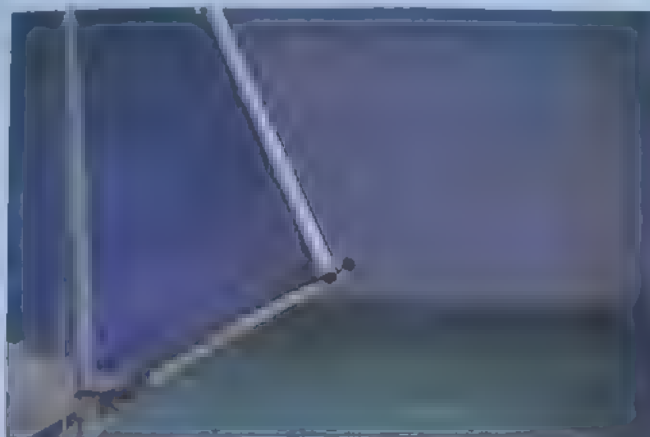
When Japan began her path from the clutches of poverty, her critics remarked that her cheap imitations of Western leaders they are. The Japanese have been able to develop a unique style of photography, one that is both modern and traditional, and that is both expressive and critical.

even though it is not always understood, Japanese photography can no longer be seen as a mere imitation of Western photography. It is a unique and powerful art form, one that is as important as any other in the world. The fact that Japanese photographic images are as important as Japanese literature and art is a testament to the high quality of Japanese photography.

What went wrong?

JUDGING SEA PICTURES

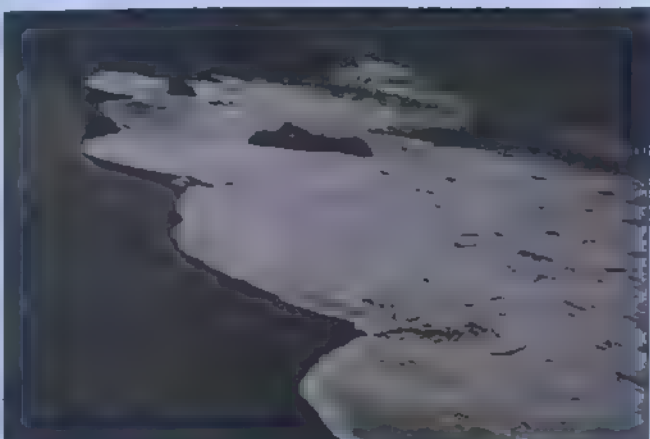
From the semi-abstract close-up to the general view, it is the thoughtfulness of approach which marks the successful sea photograph as our judges found with these five pictures



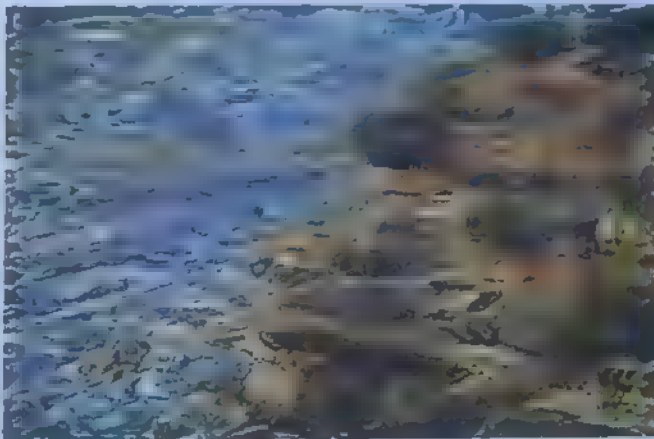
A



B



C

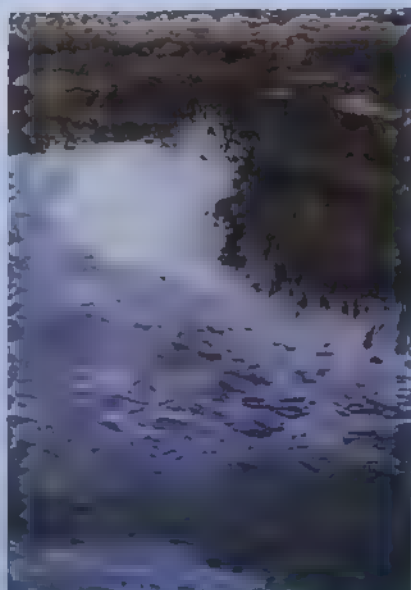


D

Photographers' Choice
John Sims **ADCBE**
Homer Sykes **CBADE**
Ian McKinnell **DEACB**
Colin Molyneux **ADBCE**

There was a large degree of agreement among the panel about the order of these sea pictures. A and D did consistently well, probably because, as John Sims said, 'they concentrate on specific aspects of the sea which are simple, clear and unmistakable'. John Sims and Colin Molyneux both put A as their first choice—Molyneux 'for its 'sheer originality', Sims 'because the photographer has consciously thought about composition'.

Ion McKinnell was very impressed by D. 'It is a perfect example of how much a relatively simple image can say—conjuring up as it does thoughts of summer, of the sun, of the Mediterranean—a beautiful photograph'. He put E second, saying that 'it possesses some of



E

... it has a different, less... it, imparting thoughts of another season, another country'. Interestingly all the other photographers placed E last, Colin Molyneux picking it out 'as it really hasn't enough action to make it successful'.

Homer Sykes's stood out as an unusual selection. Most of the panel were not particularly impressed by C but he placed it first, liking 'the way the photographer has deliberately underexposed the photograph, taking his reading from the white surf. This darkens the picture and heightens the dramatic effect'. Homer Sykes also like B, though he said 'It could have been improved if the photographer had waited or changed his angle slightly so as to silhouette all three people'.

It is perhaps interesting to note that although different photographers were impressed with different photographs they often spoke of the same quality—a thoughtful approach to the subject.





Creative approach

eye TO eye

One of the best ways of developing an eye for a picture is to look at the work of others. Here we put the picture to a test of the work of some photographers in the art of the eye.

There are many ways of looking at a picture. Some people look at the subject, some at the composition, some at the lighting, some at the colour, some at the texture, some at the mood, some at the story, some at the technique, some at the style, some at the camera, some at the film, some at the print, some at the exhibition, some at the collector, some at the dealer, some at the critic, some at the public, some at the artist, some at the art, some at the world.

1991 1992 1993 1994



David Hume/Photo Image Bank



cantabrian



Paul Davis Hamilton is well known for his dreamlike images of young girls—a quality often produced by using soft focus techniques. Here the effect has been created in a more subtle way, by shooting through a screen door—similar in effect to using a texture screen. The softness of the natural light and the relaxed pose both enhance the romantic atmosphere that has become Hamilton's trademark.

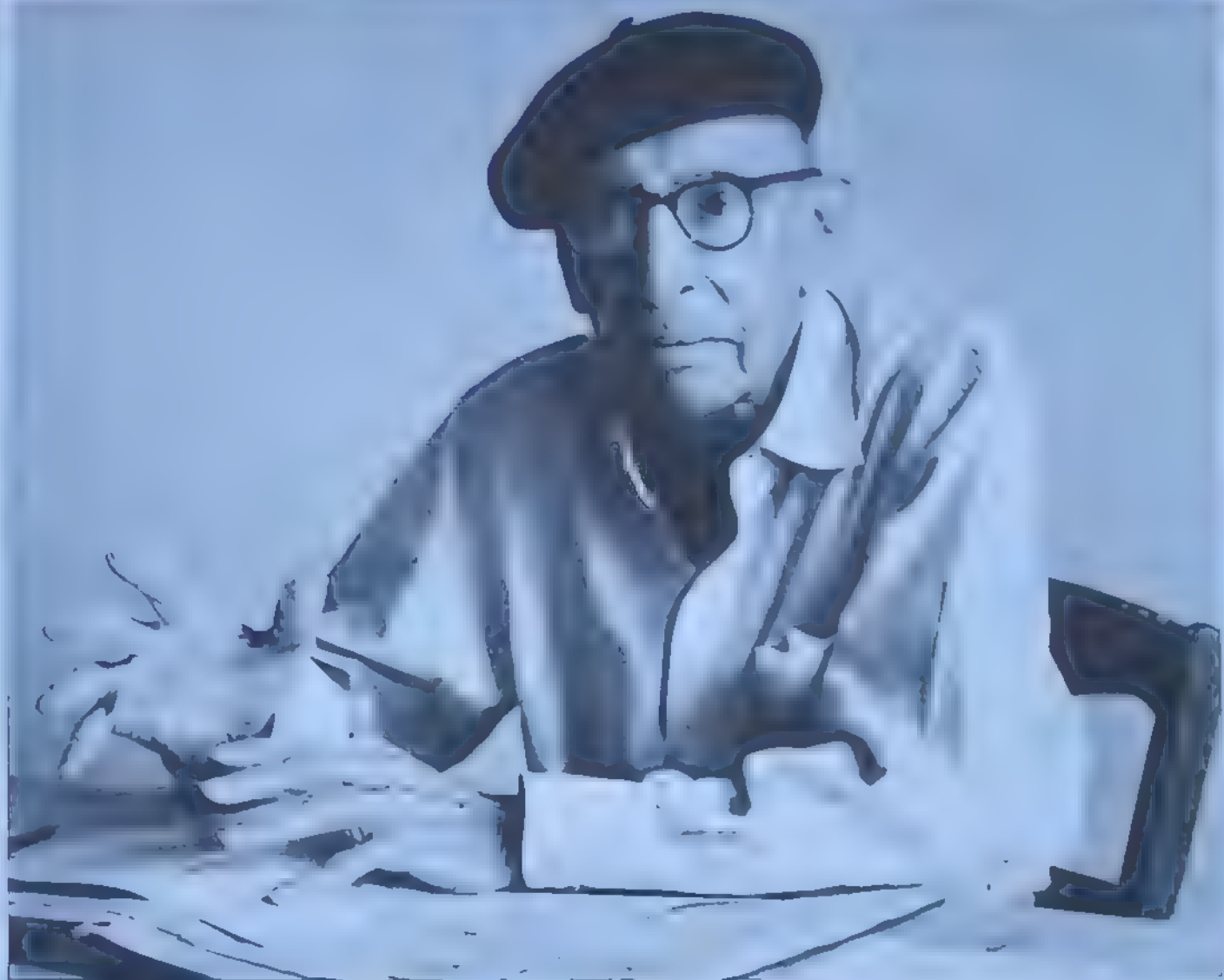
Monochrome Scott Gleason also has a very distinctive style but this is strongly manifested in high contrast, grainy black and white landscapes. The effect is achieved by his choice of subject and over-development of the 160 film he uses. He also manipulates images on occasion by scratching marks directly on to the emulsion of his negative—he sometimes even uses a tractor to plough designs in the field! While composition is still an integral part of this image, his own approach to landscapes is to rely heavily on pure shapes and form, aiming for a more impressionistic interpretation of the region.

The Irvine Sports photographers are all expected to produce crisp, clear images of the action involved. But what really distinguishes the creative sports picture is graphic shapes and peak-of-the-action moments caught on film. Here this is illustrated by the athlete's determined face, his leg just forced over the hurdle and his torso, muscles restrained even.

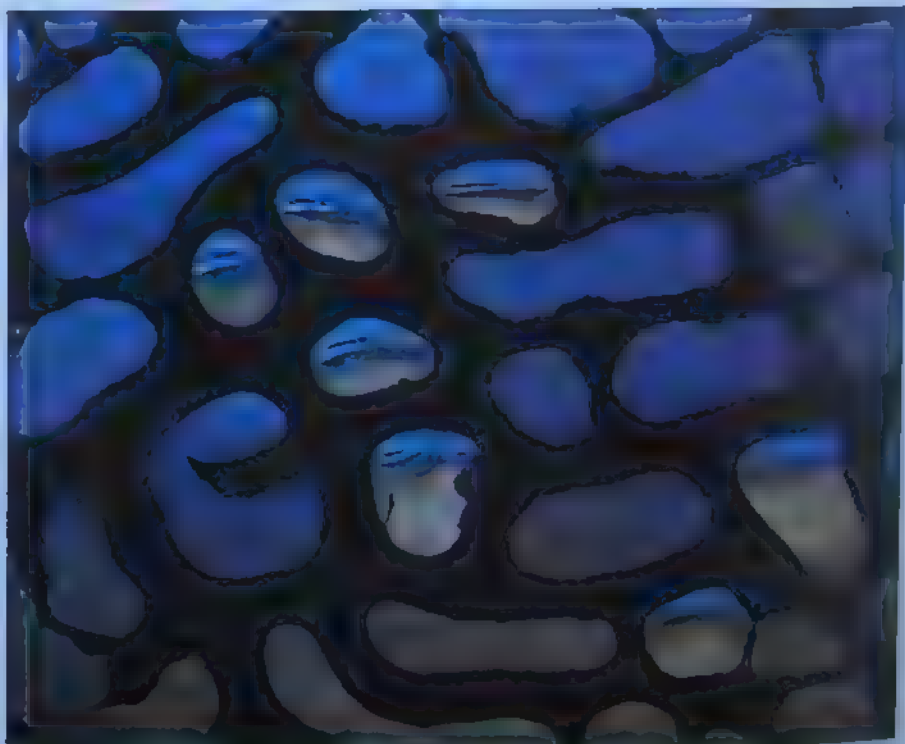


Truck Park, polarized light gives a hard edge to this simple but graphic image of a truck stopped on a lonely road in the American West. Pat Turner exploited the stretched perspective of a 35 mm lens to fill a large part of the frame with the bright chrome work and set the overexposed machine against the natural beauty of the rocky landscape. The lines on the road break up the dull colour of the foreground and the top elements of the composition fall into horizontal and vertical thirds.

Madison Building The bold lines, of colour, the hard diagonal shadow breaking up the foreground and the small but significant figure silhouetted against the pale wall, all combine to create a strong, graphic image. David Lee shows here that important element of a scene need not occupy a large part of the frame to be significant. The shot also shows how patterns are revealed by looking for the right moment—the figure completes the photograph.



Stravinsky With portraiture, just as with sport, choosing the right moment to press the shutter is half the battle. Here Snowden captured a moment of animation, generated, in particular, by the composer's hands which have become a very important part of the overall shot. Wave washed coral The tiny pools of seawater lodged in a piece of coral magnify sections of the beach and sky in this close-up study by Ernst Haas. The image shows what can be done by looking at the world in detail. Each hole in the coral resembles a cell seen through a microscope and contribute to the theme of 'Creation'—the book in which this photograph appears. New York street scene Here again, compositional 'rules' have been observed—vertical elements are divided into thirds just as the figure and the cat are positioned a third of the way up the frame, producing a pleasing compositional arrangement. The wall and curbs lead the eye straight to the centre of interest. An image like this is the result of careful observation and an ability to react quickly and instinctively to make the best of things before the subject becomes aware of the camera or the scene changes.





Chemicals A-Z

For success in the darkroom, you must be familiar with all the materials. This glossary provides a quick and easy to follow reference to all the common chemicals and formulae and what they are used for.

If you are a keen darkroom worker you are bound to be surrounded by a variety of chemicals. Some are used in constant use and others only from time to time. This ready reference guide, which you can keep handy at all times, should help you to instantly identify all the most common darkroom chemicals and their uses in photography.

Most darkroom chemicals are fairly easy to obtain and relatively safe when used and handled properly (see page 561). Some, however, have varying degrees of toxicity and should be obtained from a pharmacist or specialist supplier.

Regulations differ throughout the world, but as a guideline any substance found on the poisons list in the UK (marked * in this list) is usually subject to restrictions on its sale.

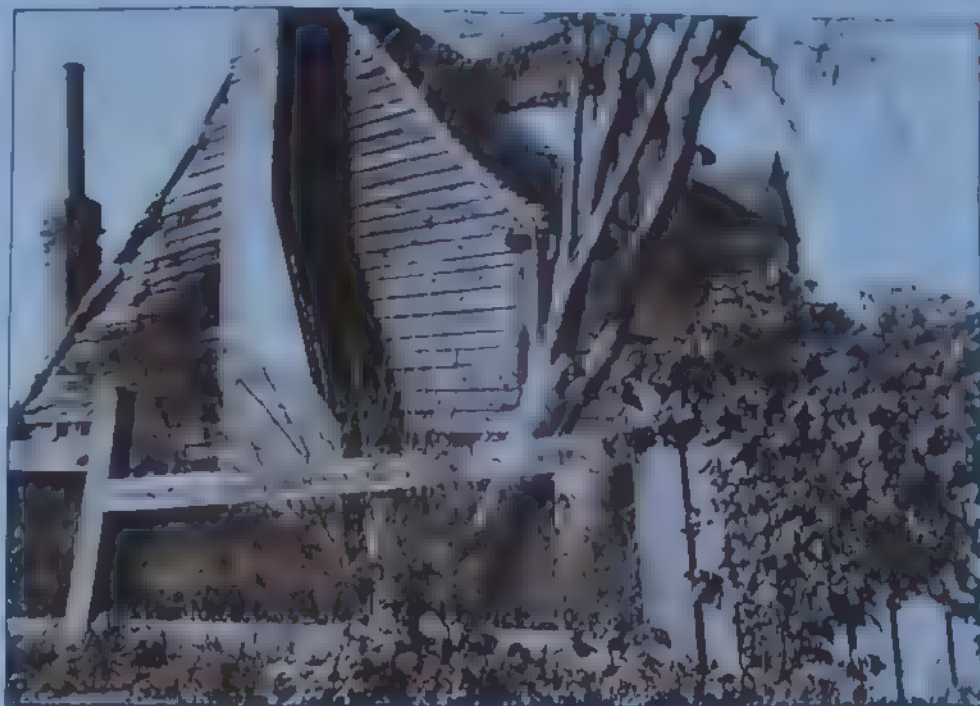
On the purchase of any chemical, convince the pharmacist or supplier that you have a satisfactory reason for needing that particular material. You often have to be seen by the pharmacist personally and you must sign a declaration giving the reason for purchase. In the UK, the personal discretion of the pharmacist or supplier.

When you buy a chemical, be sure to check the label. In case there are any restrictions, you should be aware of them. Be sure that jars and bottles are clearly labelled, so as to avoid confusion. It is also a good idea to label stoppers.

Acetic acid, CH_3COOH , is a water soluble, colourless corrosive solution that smells like vinegar and is used in stop baths, fixers and hardeners. An 80 per cent solution is available from photographic suppliers. Concentrations over 98 per cent are known as glacial acetic acid because it freezes below 16.5°C . You should store it in airtight bottles to prevent it absorbing moisture from the air, and avoid splashes or breathing the fumes.

Acetone, $(\text{CH}_3)_2\text{CO}$. This colourless, sweet smelling, flammable liquid dissolves easily in water or alcohol and is used for repairing celluloid film. It should be stored away from heat in stoppered bottles to prevent evaporation. Avoid breathing the fumes.

Alcohol, $\text{C}_2\text{H}_5\text{OH}$. Various types are available but industrial methylated alcohol is best for photographic use. It is



a flammable liquid that evaporates quickly and smells slightly sweet. It is used for cleaning and rapid drying of prints and should be stored away from heat in stoppered bottles. Purple coloured methylated spirit should not be used as a substitute as there is a risk of dissolving the film base. Avoid breathing the fumes.

Amidol, sometimes called diamino-phenol, formula $\text{C}_6\text{H}_3\text{OH}(\text{NH}_2\text{HCl})_2$, is a bright grey powder that dissolves in water to give a solution that is corrosive and stains anything it touches. Used as a developing agent, this chemical should be stored in clear airtight bottles so its colour can be seen because if it turns brown it should be thrown away. The solutions should be used immediately as it has poor shelf life, but the powder keeps quite well.

* **Ammonia, NH_3** . A clear, sharp smelling gas normally supplied in 35 per cent solution form that is known as 0.880 (eighty-eight) ammonia—a measure of its specific gravity. It is a strong alkali, soluble in water and used for hypo elimination in prints. This substance is on the poisons list and supply is restricted through pharmacists. It must be stored in tightly capped polythene bottles in small quantities and used in well ventilated conditions. Avoid splashes and breathing the fumes.

Complete control Only if you are very familiar with chemicals used in processing can you get the most out of any image.

Ammonium bichromate. Also known as ammonium dichromate, $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$. Orange crystals soluble in water and often used as an alternative to potassium dichromate in the gum dichromate and carbo processes. It is a corrosive agent and should be stored in reasonably dry conditions to prevent crystals sticking together. See also sodium bichromate.

Ammonium chloride, sometimes referred to as sal-ammoniac NH_4Cl . This is a white crystalline powder that dissolves freely in water and is a constituent of rapid fixers, it should be kept dry to prevent the crystals sticking together, and is a mild corrosive. There are no restrictions on supply or storage.

Ammonium persulphate, $(\text{NH}_4)_2\text{S}_2\text{O}_8$, is a white crystalline powder that is very easily dissolved in water and used for toning and reducing. It must be kept in airtight jars because it absorbs moisture from air and loses strength. Any solution prepared should be used at once. This is flammable and corrosive and a similar chemical to potassium persulphate.

Ammonium thiosulphate, $(\text{NH}_4)_2\text{S}_2\text{O}_3$. A clear, corrosive material in crystal form that is soluble in water and used in

Borax.

soluble
in water
for use in
developers
apply or
storage

Chlorquinol.

A fairly soluble white crystalline powder used for warm tone developing. It is easily available but mildly corrosive and should be stored in glass jars.

Chrome alum is the common name for potassium dichromate sulphate. It is a white crystalline powder. The crystals are soluble in water. It is used as a hardener in developers. It is also used as a mordant in dyeing. It is a strong oxidizing agent and should be handled with care. It is a powerful irritant and should be stored in glass jars.

Copper sulphate, $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, used to make blue prints. It is a soluble blue crystalline powder. It has many photographic uses including bleaches, toners and toners, but supplies may be limited. Airtight storage is important because the crystals lose their lustre from the air.

Developers

Kodak D19 An excellent high contrast negative developer suitable for continuous tone and line work.
water at 50°C 500.0 ml
Metol developing agent 2.0 g
Hydroquinone 8.0 g
sodium sulphite anhydrous 90.0 g
sodium carbonate anhydrous 45.0 g
potassium bromide anhydrous 5.0 g
add cold water to make up to 1.0 litre

Kodak DK50 A fairly high contrast developer suitable for increase in contrast.
water at 50°C 500.0 ml
Metol developing agent 2.5 g
sodium sulphite anhydrous 30.0 g
Hydroquinone 2.5 g
Kodak balanced alkali 10.0 g
potassium bromide anhydrous 0.5 g
add water to make up to 1.0 litre
This is the stock solution suitable for dish development and should be diluted 1+1 for tank working.

Kodak D76 A normal contrast clean working developer. Stock solution may be used neat or diluted 1+1.
water at 50°C 750.0 ml
Metol developing agent 2.0 g
sodium sulphite anhydrous 100.0 g
Hydroquinone 5.0 g
borax 2.0 g
add water to make up to 1.0 litre

Metol.

Metol is a white crystalline powder. It is used in developers. It is a mild irritant and should be handled with care. It is a powerful oxidizing agent and should be stored in glass jars.

Crawley's 1A A high speed developer giving an increase of up to one stop in film.
Metol developing agent 0.5 g
sodium sulphite anhydrous 5.0 g
sodium carbonate anhydrous 2.5 g
potassium iodide 0.001 % solution 5.0 ml
add water to make up to 1.0 litre
This is a one shot developer. It is used in a single step process.

Farmer's formula reducer
water at 50°C 500.0 ml
sodium thiosulphate crystals 240.0 g
sodium sulphite anhydrous 10.0 g
sodium metabisulphite 25.0 g
water to make up to 1.0 litre

stock solution B
sodium thiosulphate crystals 480.0 g
water to make up to 2.0 litre
1 part stock A + 4 parts stock B + 27 parts water to make up to 1.0 litre
This is a one shot developer. It is used in a single step process.

Ferric ammonium citrate, $\text{Fe}(\text{NH}_4)_2(\text{C}_6\text{H}_5\text{O}_7)_3$ Takes the form of bright green crystals that are water soluble and soluble in alcohol.

Stop bath indicator When the normal yellow colour of the solution turns purple, it is time to replace the exhausted solution.



Ferric chloride, $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$.

Ferric chloride is a dark brown crystalline powder. It is used in developers. It is a strong irritant and should be handled with care. It is a powerful oxidizing agent and should be stored in glass jars.

Fixers

Plain acid fixer
sodium thiosulphate crystals 240.0 g
sodium bisulphite 25.0 g
water to make up to 1.0 litre

Kodak F24 non hardening fixer bath
water at 50°C 600.0 ml
sodium thiosulphate 240.0 g
sodium sulphite anhydrous 10.0 g
sodium metabisulphite 25.0 g
water to make up to 1.0 litre

Kodak F7 rapid fixer bath
water at 50°C 600.0 ml
sodium thiosulphate 360.0 g
ammonium chloride 50.0 g
sodium sulphite anhydrous 15.0 g
acetic acid 80 per cent solution 17.0 ml
boric acid crystals 7.5 g
potassium alum 15.0 g
water to make up to 1.0 litre
NB Prolonged immersion of fine grain material is not recommended in this bath as some bleaching may occur.

Alternative high speed fixer
ammonium thiosulphate 175.0 g
sodium sulphite anhydrous 25.0 g
glacial acetic acid 10.0 ml
boric acid crystalline 10.0 g
water to make up to 1.0 litre

Formalin is a 10 per cent solution of formaldehyde (HCHO) in water. It is a clear, colourless liquid with a sweet and slightly pungent odour. It is used in hardening and toning. It is a powerful irritant and should be handled with care. It is a powerful oxidizing agent and should be stored in glass jars.

Glycerine, $(\text{CH}_2\text{OH})_2\text{CHOH}$ A clear, viscous and apparently oily liquid that is soluble and used for printing badly.

Sodium carbonate, Na_2CO_3 is a white crystalline powder.

Darkroom

As for the only 300 g of
100% pure silver

from powder
and the silver
metal itself

Gold chloride
 $\text{AuCl}_3 \cdot \text{HCl}$ 10g
material that is

water 750.0 ml
acetic acid 28 per cent solution 125.0 ml
silver nitrate crystals 7.5 g
water to make up to 1.0 litre

Store in an airtight jar
Use as a developer for
black and white prints

Kodak D-19 developer
water at 26.5°C 750.0 ml
potassium iodide 190.0 g
water to make up to 1.0 litre

Indicators for stop bath life are usually
either bromocresol green or bromo-
cresol purple. These are used in a
solution of 0.1 per cent in water. The
solution is used to test the life of the
stop bath. If the solution turns yellow
the stop bath is exhausted and should
be replaced. If the solution remains
green or purple the stop bath is still
usable.

Mercuric chloride, HgCl_2 is a white
crystalline powder that is soluble
in water. It is used as a fixer in
black and white photography. It is
very toxic and should be handled with
extreme caution. It is used in a
solution of 0.1 per cent in water.
It is used to fix the silver in the
print. It is used in a solution of
0.1 per cent in water. It is used
to fix the silver in the print. It is
used in a solution of 0.1 per cent
in water. It is used to fix the
silver in the print. It is used in a
solution of 0.1 per cent in water.

Hypo test You can test washed and dried
prints—usually off the actual image area—
for residual hypo in archival processing



Metol is a white crystalline powder that is highly
soluble at room temperature. It is
soluble in water or in a white solution.

Oxalic acid, $(\text{COOH})_2 \cdot 2\text{H}_2\text{O}$

Paraphenylenediamine, $\text{C}_6\text{H}_4(\text{NH}_2)_2$,
is a light brown powder that is used
in a grain formulae. It is used in a
solution of 0.1 per cent in water.
Tightly fitting jars are preferred. A more stable substitute
is paraphenylenediamine. It is a
soluble white powder with
improved keeping quality.

Phenidone, $\text{C}_6\text{H}_5\text{N}(\text{CH}_2)_2\text{NHCO}$, is
a white crystalline powder that is
soluble in water. It is a developing agent
and due to much reduced risk and higher
activity, it is a preferable alternative to
Metol. There are no restrictions on
supply or storage.

Potassium alum, $\text{KAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$. Potassium
aluminium sulphate is a fairly
soluble colourless, crystalline material
used as a hardener in fixing baths. There
are no restrictions on supply or storage.

Potassium bichromate, sometimes called
potassium dichromate, $\text{K}_2\text{Cr}_2\text{O}_7$, is a
red crystalline powder. It is used
in a solution of 0.1 per cent in water.
dichromate processes. There are no
restrictions on supply and it is best to
keep the crystals dry in an airtight jar.
Ammonium bichromate is often used as a
substitute.

Potassium bromide, KBr . The crystals
of this substance are opalescent and
shaped like small cubes; they are easily
dissolved in water. They are used as
restrainers in bleaches and developers.
There are no restrictions on supply or
storage.

Potassium carbonate, K_2CO_3 ,
sometimes called potash is a soluble
white powder that absorbs moisture
from the air. It is used in some
developer formulae and there are
no restrictions although it is somewhat
corrosive and requires tightly sealed
storage.

Hardeners

Kodak SH1 Formalin prehardener for
negatives that are to be immersed in
chemical treatment baths
water 500.0 ml
formaldehyde 40 per cent solution 10.0 ml
sodium carbonate anhydrous 5.0 g
water to make up to 1.0 litre

Kodak F5a hardening bath solution to
add to plain fixer solutions
water at 50°C 600.0 ml
sodium sulphite anhydrous 75.0 g
acetic acid 80 per cent solution 82.0 ml
boric acid crystals 37.5 g
potassium alum 75.0 g
water to make up to 1.0 litre
Add one part of the solution to four
parts of fixer solution and stir rapidly

Hydrochloric acid, HCl , is a colourless
liquid that is highly corrosive. It is
used in a solution of 0.1 per cent in
water. It is used to fix the silver in
the print. It is used in a solution of
0.1 per cent in water. It is used to
fix the silver in the print. It is used
in a solution of 0.1 per cent in water.
It is used to fix the silver in the
print. It is used in a solution of
0.1 per cent in water. It is used to
fix the silver in the print. It is used
in a solution of 0.1 per cent in water.

Hydrogen peroxide, H_2O_2 , is a pale blue
solution that is used as a bleaching
agent in bleaches and hypo eliminators. In use
this solution releases oxygen and the
labelling indicates this activity, for
example a 20 volume solution (6 per
cent) will release more oxygen than a 10
volume solution (3 per cent). Good
ventilation is needed to minimize the risk
of ignition and the solution should be
stored in airtight jars in a cool
dark environment.

Hydroquinone, also known as quinol,
 $\text{C}_6\text{H}_4(\text{OH})_2$, is in the form of off white fine
needle shaped crystals that are soluble
in hot water. It is a popular developing
agent and is readily available although
mildly corrosive. It should be stored in
airtight glass jars and not plastic,
because quinol is sensitive to moisture
and static electricity, and the crystals
may jump around as a result.

Indicator solutions.

For the purpose of this book, the following
indicators are used:

Potassium chloroplatinite, K_2PtCl_6 .

White crystalline substance, soluble in water. It is used in the preparation of platinum prints.

Potassium ferricyanide, $K_3Fe(CN)_6$.

White crystalline substance, soluble in water. It is used in the preparation of Prussian blue.

Potassium hydroxide, also called

caustic potash or potassium hydrate. It is a white crystalline substance, soluble in water. It is used in the preparation of various photographic chemicals.

Potassium iodide, KI . It is a white

crystalline substance, soluble in water.

*Potassium oxalate, $K_2(CO_2)_2 \cdot H_2O$.

White crystalline substance, soluble in water. It is used in the preparation of various photographic chemicals.

Potassium permanganate, $KMnO_4$, is a

dark blue crystalline substance. It is used in the preparation of various photographic chemicals.

Potassium persulphate, $K_2S_2O_8$, is a

white crystalline substance, soluble in water. It is used in the preparation of various photographic chemicals.

Silver nitrate, $AgNO_3$, is a white

crystalline substance, soluble in water. It is used in the preparation of various photographic chemicals.

Sodium bichromate, $Na_2Cr_2O_7 \cdot 2H_2O$.

Red crystals, very soluble in water. It is used in the preparation of various photographic chemicals.

Proper chemical storage It is essential to keep raw and prepared photographic chemicals away from children's reach, and in a locked cabinet. This you can make for the purpose—or you may prefer to convert an existing one. It should be made of sturdy wood, with blockboard or planking rather than laminated chipboard unless this is very well supported. Polythene sheeting, enamelled metal trays and Formica Melamine can all be used for protection against accidental spills—which must be wiped immediately. Make sure the cabinet is level and does not rock. If placed on the floor—within reach of children—or elsewhere subject to searching eyes—fit a lock. Choose a room which is both dry and moderately cool.

Sodium bisulphite, $NaHSO_3$. A sharp smelling white powder that is fairly soluble in water and is used as a preservative in developer solutions. It is sold in various sizes, and is very hygroscopic.

Sodium bromide, $NaBr \cdot 2H_2O$. A white crystalline substance, soluble in water. It is used in the preparation of various photographic chemicals.

Sodium carbonate anhydrous, Na_2CO_3 . It is a white crystalline substance, soluble in water.

***Sodium hydroxide, $NaOH$.** It is a white crystalline substance, soluble in water. It is used in the preparation of various photographic chemicals.

Sodium metabisulphite, $Na_2S_2O_5$.

It is a white crystalline substance, soluble in water.

Sodium metaborate, $NaBO_2 \cdot 2H_2O$.

It is a white crystalline substance, soluble in water.

Sodium sulphide, $Na_2S \cdot 9H_2O$.

It is a white crystalline substance, soluble in water.

Sodium sulphite, $Na_2SO_3 \cdot 7H_2O$.

It is a white crystalline substance, soluble in water.

Stop baths

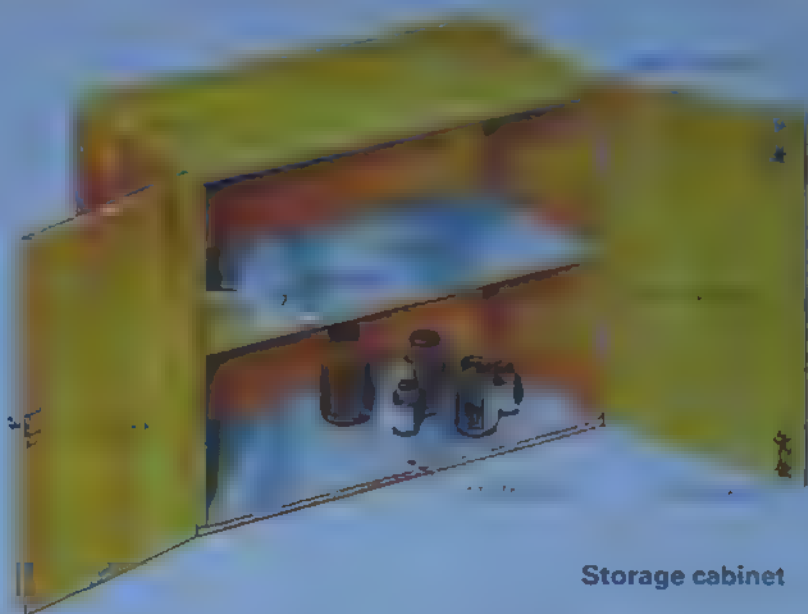
water 1 litre
acetic acid 10 ml
chromic potassium sulphate 20 g
water to make up to 1 litre

Sodium thiocyanate,

It is a white crystalline substance, soluble in water.

Sodium thiosulphate, $Na_2S_2O_5 \cdot 5H_2O$.

It is a white crystalline substance, soluble in water.



Storage cabinet

Understanding...

HOW A LENS IS MADE

In these days of electronic wizardry, it is surprising to find that lenses have been made in virtually the same way for centuries. Though tolerances are higher, glasses are still worked to the correct shape by grinding with abrasives.



lenses are made in a variety of shapes and sizes, but the basic principle is the same. The glass is first cut into a rough shape, then ground and polished to the required curvature. The final shape is determined by the intended use of the lens.

Final grinding and testing is done by a skilled technician.

For lenses made in large numbers, the blanks may be moulded to near the required diameter and surface, but some truing up

is still required. The final shape is determined by the intended use of the lens.

lenses are made in a variety of shapes and sizes, but the basic principle is the same. The glass is first cut into a rough shape, then ground and polished to the required curvature. The final shape is determined by the intended use of the lens.

Final grinding and testing is done by a skilled technician.

For lenses made in large numbers, the blanks may be moulded to near the required diameter and surface, but some truing up

is still required. The final shape is determined by the intended use of the lens.

lenses are made in a variety of shapes and sizes, but the basic principle is the same. The glass is first cut into a rough shape, then ground and polished to the required curvature. The final shape is determined by the intended use of the lens.

Final grinding and testing is done by a skilled technician.

For lenses made in large numbers, the blanks may be moulded to near the required diameter and surface, but some truing up

is still required. The final shape is determined by the intended use of the lens.

Blanks The glass blanks from which these lenses are cut are cut from larger slabs of optical glass free from defects and

Final grinding and testing is done by a skilled technician.

For lenses made in large numbers, the blanks may be moulded to near the required diameter and surface, but some truing up

is still required. The final shape is determined by the intended use of the lens.

placed in the
position

perform
made master curve (the
plate) is placed in conta
with one of the lenses an

chromatic light
mercury vap
interference

phenomenon
sometime

light Each fin
in gap of half
of light
The
th

angular fring
would prod
in the final in

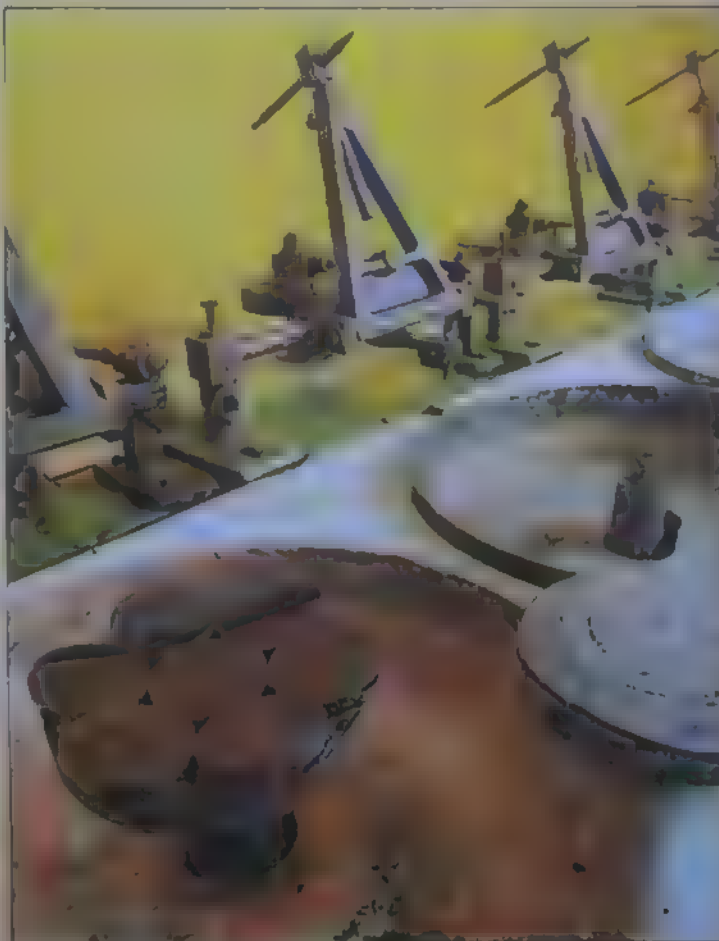
astronomical requires
on higher gear
accuracy Pre
this, achie
simple equipm
normal engineering to
ances seem rather sloppy

When the first sides
lenses are finished they are
off the block and turned
over to polish the re
sides. The number of lenses
which can be fitted on to a
block has a direct bearing on
the price of the product.
Steeply curved lenses have
to be polished individually,
since a block of them would
be more than a hemisphere,
and unmanageable for
machine work. This extra
expense is a challenge to
designers who also try to
avoid very thin lenses which
may distort on polishing



Molten glass Optical glass
contains a complex mixture of
trace elements. Cooling must
be monitored with great care,
to avoid internal stress,
bubbles and impurities. This
is essential because the
refractive index of the glass
used affects the calculated
focal length and performance
of the final lens

Polishing machine The tool on
the right fits over the block of
lenses, in this case concave
ones. The arm moves the tool to
and fro every second or so,
while the turntable rotates a
few times each minute. A
solution of abrasive or
polishing powder between tool
and blank grinds the glass to a
spherical surface



The fully polished and
tested elements are then
ready for use

produce or
in the final

their m
completed lens
see if it meets the
on. This may be
in a vari
standard te

proj
target
examined

In
tolerance
problem
various
optical
never be

waste of gl

The latest generation of milling machines can produce surfaces fine enough to finish without smoothing. Techniques are available to polish lenses to rough shape within minutes rather than hours. Advant are being made in the US and Europe in single point diamond turning and computer controlled polishing which may have an impact in the production of new lens designs using aspheric components. The cost, uniqueness, and hence limited usefulness of this

presently being used largely in military applications. For

tion will remain based on traditional methods, helped along by better machinery inspection and techniques

World of photography

ANTHONY EDGEWORTH

Anthony Edgeworth took up photography as a career relatively late in life, but this has not prevented him from rising to the peak of his profession



was inspired by his desire to produce photography that was not tied to photographing the Royal Household and their traditional London environment was

Gloved hands This close-up of a Welsh Guards officer was shot using daylight to give rich, natural colour

Portrait Edgeworth spotted this Life Guards Lieutenant riding in Hyde Park and arranged a portrait session





Brasilia cityscape This ultra-wide angle juxtaposition was taken on a shoot for a South American airline

the building's facade is a complex grid of windows and balconies, creating a rhythmic pattern of light and shadow. The building's form is a stark contrast to the organic shapes of the surrounding landscape. The ultra-wide angle of the shot emphasizes the building's scale and the vastness of the sky. The juxtaposition of the modern architecture with the natural environment creates a powerful visual statement. The image is a testament to the power of architectural photography to capture the essence of a place and its built environment.

The building's facade is a complex grid of windows and balconies, creating a rhythmic pattern of light and shadow. The building's form is a stark contrast to the organic shapes of the surrounding landscape. The ultra-wide angle of the shot emphasizes the building's scale and the vastness of the sky. The juxtaposition of the modern architecture with the natural environment creates a powerful visual statement. The image is a testament to the power of architectural photography to capture the essence of a place and its built environment.

The building's facade is a complex grid of windows and balconies, creating a rhythmic pattern of light and shadow. The building's form is a stark contrast to the organic shapes of the surrounding landscape. The ultra-wide angle of the shot emphasizes the building's scale and the vastness of the sky. The juxtaposition of the modern architecture with the natural environment creates a powerful visual statement. The image is a testament to the power of architectural photography to capture the essence of a place and its built environment.



Paris river scene A three-month visit to Europe allowed Edgeworth to shoot photographs for his own stock

Eiffel Tower To get some atmospheric shots of Paris, Edgeworth went out before dawn on a rainy day





Anthony Edgeworth

For me, this is not the case. I've taught me all about lighting, but I still don't know how to use it. I'm not a professional, but I'm more animated and more whatever or whatever I'm photographing.

For me, it's all about the advertisement. I don't care if it's off the top of the head, but it's something that's important. Edgeworth is a 35-year-old photographer exclusively. The main thing is that are to be blown up to billboard size or to long narrow strips fitted to the sides of buses. He feels that the combination of Nikon optics and Kodachrome 25 film always give him the quality he needs—and always satisfies

Doorway On a trip through the Arran Islands on assignment, Edgeworth took a number of personal shots of local details

Landscape The heavy clouds of a thunderstorm invested this Burgundy landscape with drama

him. He's been in the Kodak business for 15 years, and he's been in the Kodak business for 15 years. He's been in the Kodak business for 15 years, and he's been in the Kodak business for 15 years. He's been in the Kodak business for 15 years, and he's been in the Kodak business for 15 years.

His work is not just for the Kodak business, but for the Kodak business. He's been in the Kodak business for 15 years, and he's been in the Kodak business for 15 years. He's been in the Kodak business for 15 years, and he's been in the Kodak business for 15 years. He's been in the Kodak business for 15 years, and he's been in the Kodak business for 15 years.



Print fading test

Colour prints fade even under ideal conditions, but the extent and rate of fading varies from print to print—so we conducted a long term trial to see which best stood the test of time

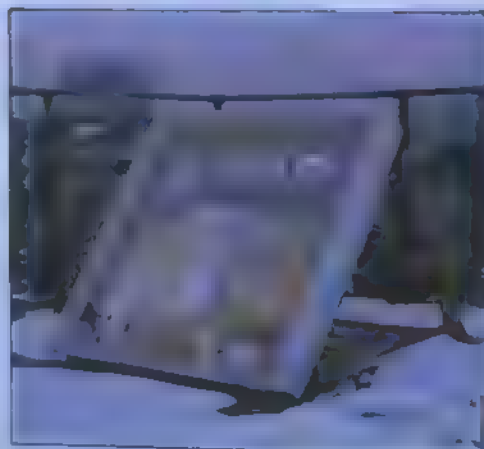


everlasting could be...
ago, due to improv
ture and proc
image in
the medium

Essentially, the image of a colour print is stored in layers of coloured d... superimposed so they give an ill... several colours. The dye... naturally, as do all dyes, depending on how they were formed and th... ditions under which they are stor... there are at least five processes for making colour prints, and each gives a print of different duration

Colour print processes

In the photographic trade the most popular type of print is called a C-type or



Cibachrome Despite noticeable fading and bleached highlights (right above) the Cibachrome fared better under test conditions than the other print types. The original is shown on the left

Roof test To test the extent of fading, each of the test prints was mounted in a glazed frame and positioned on the roof

from a 1...
native...
quality C-type are made coated (RC) paper only, and a inexpensive

R-type or reversal print... the direct reversal process, from color slides. There are two main systems: Ektachrome and Agfachrome. These R types are available on RC paper only and are somewhat more expensive than C-types

Cibachrome prints are a kind of R type which are generally regarded separately. They are made directly from colour slides, using conventional processing, and are available on either RC or white polyester base

The dye transfer process for making prints dates back about 50 years but it is extremely tedious and expensive (see

Types of fading



valuable prints.

to last for years under similar conditions would have been used to make several reprints on

Kodak R-type (top) On this print, fading (right) produced an image almost entirely yellow and blue.

Agfa R-types Fading here produced a virtually colourless image, but some detail was still retained in the clouds. There was very little difference between the commercially produced print (middle), and the home produced print (below)



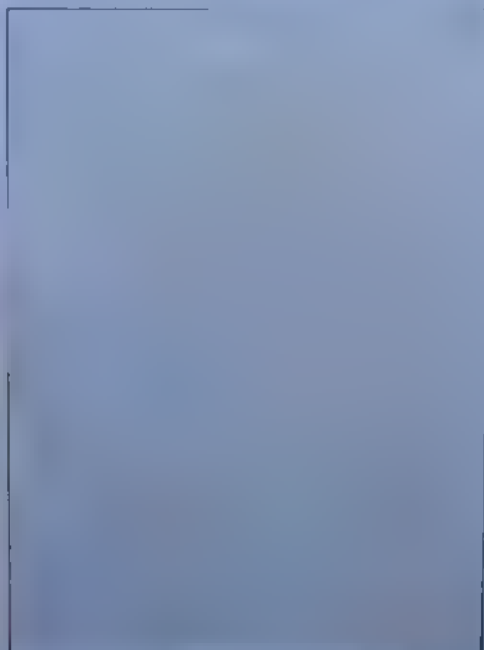
Polaroid Despite the poor quality of the original some colour was retained after the fading test. The most serious loss of colour was in the yellow areas

The test was carried out in a laboratory where the original photograph was placed in a fading test chamber. The chamber was set at a temperature of 40°C and a relative humidity of 65%. The original photograph was placed in the chamber for 24 hours. The fading test was then carried out for 24 hours. The original photograph was then removed from the chamber and the fading test was repeated. The fading test was repeated for a total of 24 hours. The original photograph was then removed from the chamber and the fading test was repeated. The fading test was repeated for a total of 24 hours.



The fading test was carried out in a laboratory where the original photograph was placed in a fading test chamber. The chamber was set at a temperature of 40°C and a relative humidity of 65%. The original photograph was placed in the chamber for 24 hours. The fading test was then carried out for 24 hours. The original photograph was then removed from the chamber and the fading test was repeated. The fading test was repeated for a total of 24 hours. The original photograph was then removed from the chamber and the fading test was repeated. The fading test was repeated for a total of 24 hours.

The fading test was carried out in a laboratory where the original photograph was placed in a fading test chamber. The chamber was set at a temperature of 40°C and a relative humidity of 65%. The original photograph was placed in the chamber for 24 hours. The fading test was then carried out for 24 hours. The original photograph was then removed from the chamber and the fading test was repeated. The fading test was repeated for a total of 24 hours. The original photograph was then removed from the chamber and the fading test was repeated. The fading test was repeated for a total of 24 hours.



Colour stability test

It is generally known that various types of print, Ciba most durable (dye transfer good) followed by instant print and C types. What is not so well known, however, is how much difference there is between these prints and how much they fade under extreme conditions. Therefore arranged a limited test which would give conclusive results after a period of a year.

A Kodachrome transparency range of bright and varied colors taken specially and from a

Agfa C-type (left) Fading here was extreme, producing a print that showed virtually no image at all, and no colour
Kodak C-type (right) Although slightly less faded than the Agfa C-type, the effects were still extreme

The results

Faint, illegible handwritten text.

A. exp. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 841. 842. 843. 844. 845. 846. 847. 848. 849. 850. 851. 852. 853. 854. 855. 856. 857. 858. 859. 860. 861. 862. 863. 864. 865. 866. 867. 868. 869. 870. 871. 872. 873. 874. 875. 876. 877. 878. 879. 880. 881. 882. 883. 884. 885. 886. 887. 888. 889. 890. 891. 892. 893. 894. 895. 896. 897. 898. 899. 900. 901. 902. 903. 904. 905. 906. 907. 908. 909. 910. 911. 912. 913. 914. 915. 916. 917. 918.

As a result of the above, the
P... ..

I have been in the
 2. 1961-1962
 3. The
 4. The
 5. The
 6. The
 7. The
 8. The
 9. The
 10. The
 11. The
 12. The
 13. The
 14. The
 15. The
 16. The
 17. The
 18. The
 19. The
 20. The
 21. The
 22. The
 23. The
 24. The
 25. The
 26. The
 27. The
 28. The
 29. The
 30. The
 31. The
 32. The
 33. The
 34. The
 35. The
 36. The
 37. The
 38. The
 39. The
 40. The
 41. The
 42. The
 43. The
 44. The
 45. The
 46. The
 47. The
 48. The
 49. The
 50. The
 51. The
 52. The
 53. The
 54. The
 55. The
 56. The
 57. The
 58. The
 59. The
 60. The
 61. The
 62. The
 63. The
 64. The
 65. The
 66. The
 67. The
 68. The
 69. The
 70. The
 71. The
 72. The
 73. The
 74. The
 75. The
 76. The
 77. The
 78. The
 79. The
 80. The
 81. The
 82. The
 83. The
 84. The
 85. The
 86. The
 87. The
 88. The
 89. The
 90. The
 91. The
 92. The
 93. The
 94. The
 95. The
 96. The
 97. The
 98. The
 99. The
 100. The

For the first time, the Commission has been able to identify the specific types of products that are being sold in the market. It has also been able to identify the specific types of products that are being sold in the market. It has also been able to identify the specific types of products that are being sold in the market.

1. The first step is to identify the problem or goal. This involves understanding the current situation, identifying the key issues, and determining the desired outcome.

2. The second step is to gather information. This involves researching the problem, identifying relevant data, and consulting with experts or stakeholders.

3. The third step is to develop a plan. This involves identifying the steps needed to achieve the goal, determining the resources required, and establishing a timeline.

4. The fourth step is to implement the plan. This involves executing the steps outlined in the plan, monitoring progress, and making adjustments as needed.

5. The fifth step is to evaluate the results. This involves assessing the outcomes of the plan, comparing them to the desired outcome, and identifying areas for improvement.



Improve your technique

FILTERS

Choosing the right filter can be difficult. So to help you, here is a list of all the most important ones, and tables showing how some of them can be used

Many problems in 1

loured filters. And can be used to create an ordinary shot into something while. As well as special there are the straightfor filters which are in catalogues. If types there at

These pages provide the filters available in ge, which is the most versatile ranging type. Just refer to the though the same numb most often in use.

their density. The additional to various ways of using some of the filters to correct for artificial lighting and the final one shows exposure increases for a

monochrom filters which are used to fine tune colour tempera



Pink

1A Pale pink These filters, often called *skyhatch* filters, are used to absorb excess UV radiation. For aerial photography they are of com-

pleteness caused by haze at high altitudes. They are also occasionally useful when there is a great deal of UV, such as a snow-covered landscape.

then better. The glass in modern lens elements usually filters out a sufficient

Yellows

Yellow filters also absorb ultraviolet radiation. They are sometimes used to filter for haze, particularly in black and white work, and are popular for aerial

contrast with black and white film. The darker yellow filters are used with colour infrared (false colour) film to prevent the result being too blue.

2A Pale yellow Absorbs UV below 390 nm. Used to reduce haze at high altitudes.

2B Pale yellow Absorbs UV below 390 nm. Better than 2A at reducing haze.

2E Pale yellow Absorbs UV below 415 nm. Like the 2B but has more effect on UV.

3 Light yellow Often used in aerial

photography to correct

8 Yellow Used to correct for sky and foliage.

9 Deep yellow Used to correct for sky and foliage.

11 Yellow green rendering in monochrome film.

12 Deep yellow Use in aerial photography.

15 Deep yellow more dramatic effects than 12.

It is used for black documents on yellow used for infrared photography.

Oranges and reds

16 Yellow orange filters are most useful for emphasizing detail in wood and brick, and also widely used for darkening blue skies in both black and white and colour photography.

also used for technical photography.

is colour separation photography.

is a method of producing a false colour image.

four components.

16 Yellow orange filters are most useful for emphasizing detail in wood and brick, and also widely used for darkening blue skies in both black and white and colour photography.

21 Orange Used to correct for black and white film.

22 Deep orange photomicrography.

it is used for the

23A Light red Use

24 Red Used to correct for

25 Red Used to correct for

26 Deep red

27 Deep red

Magentas and violets

37 Light magenta

38
39

Greens

54 Deep green

57 Green

58 Green

61 Deep green

Blues and blue-greens

40 Light blue-green

40A Light blue-green

40B Blue-green

41 Blue

41B Deep blue

51 Deep blue

38 Light blue

38A Blue

Narrow band

70 Dark red

70B Dark orange-yellow

74 Dark green

78 Dark blue-green



Filtering for effect The windmill shot was taken on colour infrared film. A red filter was used; this filter tends to give results which are very blue. You can use a range of filters to cut down the amount of blue light, including yellow, orange, red and magenta types. In this case an orange filter was used. The black and white shot was taken on normal film, but a red filter was used to darken the sky and generally increase contrast, producing this dramatic effect.

Conversion

[illegible]

Light balancing

81 series, pale amber These slabs

82 series, pale blue Th

Balancing colour

References and suggested reading

[87 Visually opaque There are few

88A Visually opaque Similar to the 87

89B Visually opaque

aerial work. It transmits radiation of

90 Dark greyish amber

92 304

EXERCISES

96 Neutral density

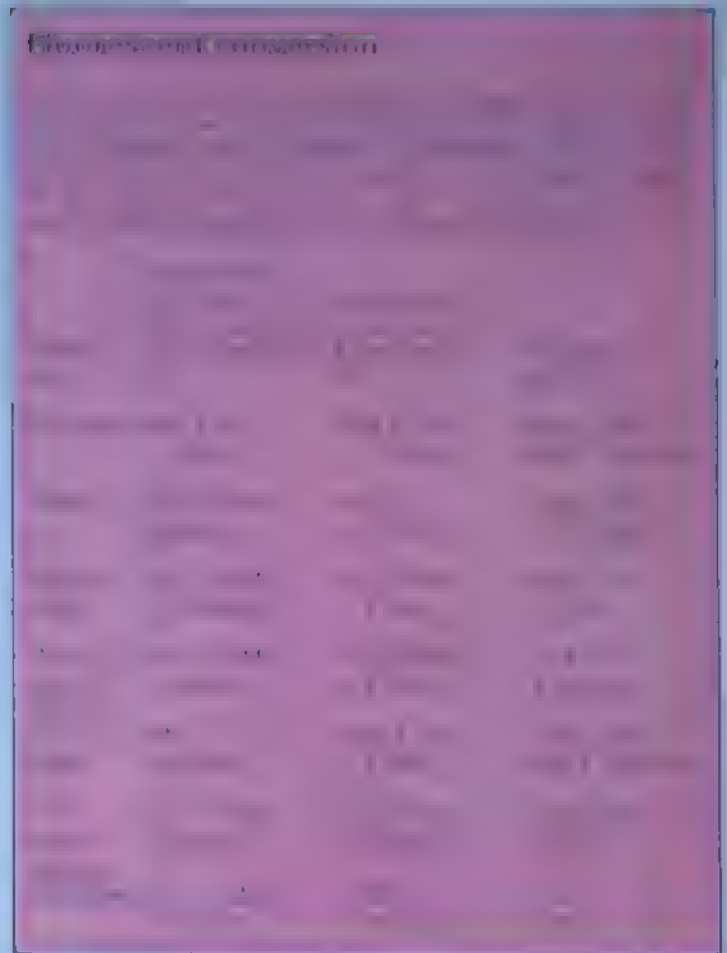
98 Blue

99 Green

Warm tones When using flash, the skin tones tend to reproduce slightly too cold. You can produce a much warmer and healthier effect by using an 8000 K bulb.

Light balance The two light sources are controlled by a dimmer knob, which can be used to adjust light balance, and a 4" series filter, right.





Neutral density

Neutral density (ND) filters have no effect on colour, but simply cut down the amount of light entering the lens, allowing you to use a larger stop, longer exposures or to take pictures of objects which are otherwise far too bright (such as the sun). The values listed are the strengths available using single filters, though other strengths can be obtained using combinations. The precise effects of these filters will vary depending on the conditions of use, as there will be reciprocity effects with long exposure times, so you should experiment.

Filter	Filter factor	Transmittance (%)	Exposure increase in stops
0.1	1.1	90	0.3
		80	0.4
		70	0.5
		60	0.6
		50	0.7
	4	25	1.0
	6	16	1.5
	10	10	2.0
	15	6.7	2.5
	1000	0.1	10.0
	2000	0.05	11.0

Colour compensating (CC)

Filter	Filter factor	Transmittance (%)	Exposure increase in stops
0.1	1.1	90	0.3
		80	0.4
		70	0.5
		60	0.6
		50	0.7
	4	25	1.0
	6	16	1.5
	10	10	2.0
	15	6.7	2.5
	1000	0.1	10.0
	2000	0.05	11.0



Barrel Rather than try to persuade his unwilling son to smile, Chris posed him in a convenient barrel and took this moody portrait.

Slide The slide was too small to allow for real action shots, so Chris posed the girl on top and waited for the wind to catch her hair and add life.

Double portrait Chris had to get in very close to frame the pair tightly and, in general, he found the Trip's lens frustratingly wide.

A Trip with the kids

Snapshots of their children probably give more people more pleasure than almost any other kind of photograph. We gave Chris Barker an Olympus Trip and a small flash to find out how good results can be achieved with even the most basic equipment.

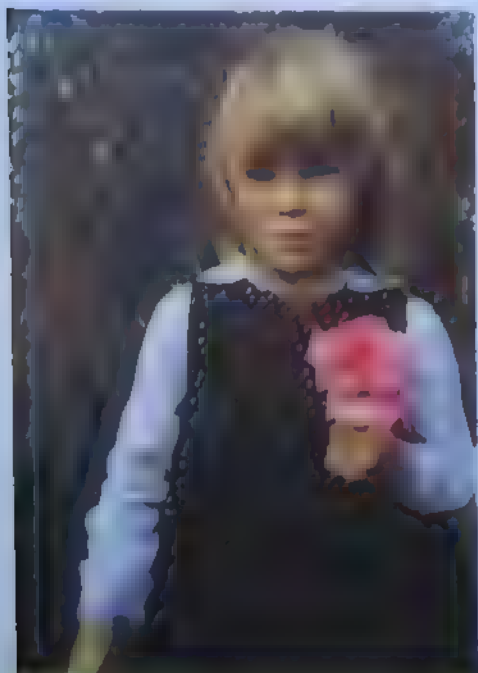






Boy is a girl, and the girl is a boy,
 and the girl is a boy, and the boy is a girl,
 and the girl is a boy, and the boy is a girl,
 and the girl is a boy, and the boy is a girl.

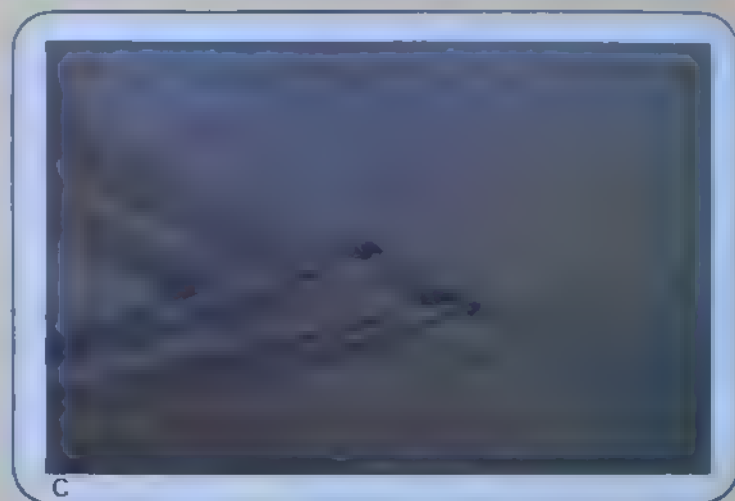
Don't forget to play with your friends,
 and to be happy and to be good,
 and to be a boy, and to be a girl,
 and to be a boy, and to be a girl.



What went wrong?

JUDGING ACTION SHOTS

Action shots are notoriously difficult to shoot well, though the range of equipment now available certainly helps. Still, as our panel found, many shots still fall down on basic technical errors

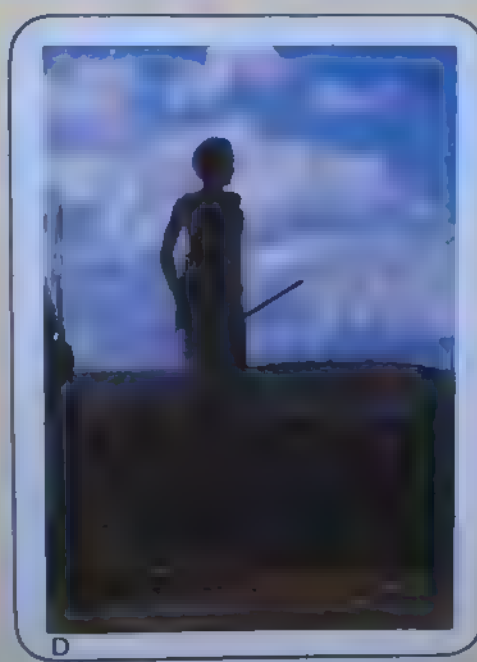


The photographs were judged by a panel of four experts: John Sims, Colin Molyneux, Ian McKinnell, and Homer. The results were as follows:

ABCD
CBAD
ABCD
BCAD

disliked them! Several of the panel had strong technical criticisms to make. John Sims said 'Two of the pictures are out of focus and one is heavily underexposed while Ian McKinnell felt that only A possessed any real merit, the other three being 'a catalogue of disasters'.

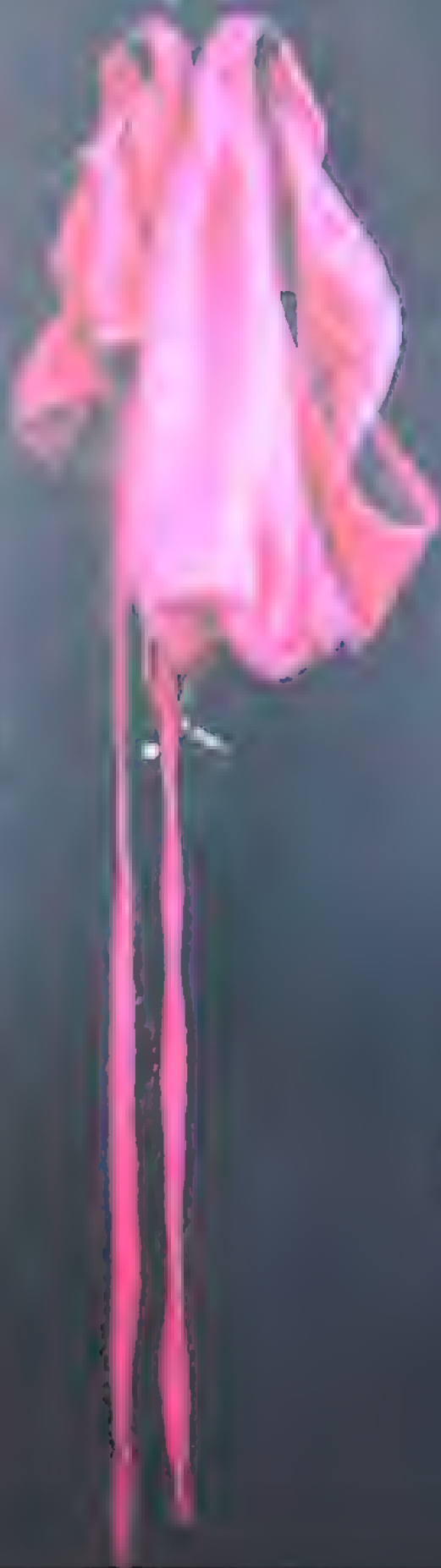
Shot D was placed last by every judge largely because the degree of underexposure made it very difficult even to see what was going on. Both Ian McKinnell and John Sims called it 'a missed opportunity'. There was more disagreement about shot A—both McKinnell and Sims put it first, Sims because he felt that 'at least the colours are strong and the situation is



Sykes placed it third. Molyneux disliked the framing with the subjects feet cut off. McKinnell said 'nothing in the top of the frame is sharp'—while B was the right to be 'simple but boring'.

placed C first but recommended the use of a much longer lens for such shots—at the moment the planes are so small I can't see them clearly—while B was the right to be 'simple but boring'.

Colin Molyneux put shot B first simply because 'I'm a car fanatic' while conceding that 'the action is frozen somewhat'. Overall the impression was one of opportunities wasted through poor technique and lack of imagination—even correct exposure and focus would have improved the quality of the photographs greatly.



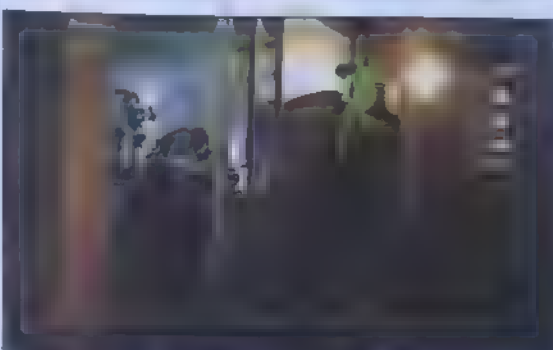
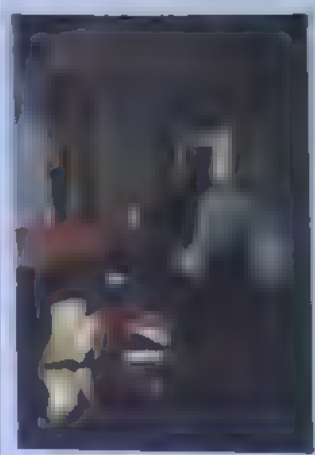


Shooting the boss

A portrait session can be used to make a simple likeness of the subject, but here photographer Brian Griffin shows that it can also be used to make a strong, mysterious image of a man and his working environment

Graphic portrait While Gray and his schoolmates at Marlboro, he worked for and explored nature, the outdoors. Here the insect became an important part of the portfolio—some that were not native to him. The unbridled with a few of his younger friends and his wife, the late Deborah.





The location. Above: Left, Brian positioned the lamp in the doorway; right, he positioned the lamp in the doorway. Below: Left, Brian positioned the lamp in the doorway; right, he positioned the lamp in the doorway.

...the first time I had ever seen a portrait of a person in a doorway. I was fascinated by the way the light came through the doorway and how it created a silhouette of the person standing in the doorway. I decided to try to create a similar effect in my own work.

In this case, he arranged it with a vacant face. This gave me a new way out his operation and out of the rest of us as a still life photograph.

After that was over, I took the and a bit of the light in Brian's studio. I started to move the lamp and the person in the room where there was a lamp. I had a bare except for the lamp. A lamp in the doorway and a person in the doorway. I had a lamp in the doorway and a person in the doorway. I had a lamp in the doorway and a person in the doorway.

After that was over, I took the and a bit of the light in Brian's studio. I started to move the lamp and the person in the room where there was a lamp. I had a bare except for the lamp. A lamp in the doorway and a person in the doorway. I had a lamp in the doorway and a person in the doorway.

Through a window Using the same basic set-up, Brian positioned one lamp in the corridor, asking Mr Maroni to stand in the window to create a more enigmatic portrait

...the first time I had ever seen a portrait of a person in a doorway. I was fascinated by the way the light came through the doorway and how it created a silhouette of the person standing in the doorway. I decided to try to create a similar effect in my own work.

In this case, he arranged it with a vacant face. This gave me a new way out his operation and out of the rest of us as a still life photograph.

After that was over, I took the and a bit of the light in Brian's studio. I started to move the lamp and the person in the room where there was a lamp. I had a bare except for the lamp. A lamp in the doorway and a person in the doorway. I had a lamp in the doorway and a person in the doorway.

Through a window Using the same basic set-up, Brian positioned one lamp in the corridor, asking Mr Maroni to stand in the window to create a more enigmatic portrait

Hyperfocal distance

infinity.

Apertures	8.25	9.84	12.40	16.90	26.50	54.10	156	216	764		
1.4	8.25	9.84	12.40	16.90	26.50	54.10	156	216	764		
3	4.37	6.68	8.72	11.80	18.50	37.80	100	141	277		
2.8	3.12	4.77	6.34	8.48	13.00	27.00	70.1	100	197	1	1
4	2.18	3.34	4.36	5.93	9.28	18.90	54.7	79.7	138	30	30
5.6	1.56	2.48	3.11	4.24	6.62	13.50	37.0	51.1	89.2	10	10
8	1.09	1.67	2.18	2.96	4.64	9.46	27.3	37.8	69.0	151	1
11	0.79	1.21	1.58	2.16	3.37	6.88	19.9	27.8	50.2	1	1
16	0.56	0.83	1.09	1.48	2.32	4.73	13.6	18.9	34.2	1	1
22	0.39	0.60	0.79	1.07	1.68	3.44	9.95	14.0	25.1	1	1
32	0.27	0.41	0.54	0.74	1.16	2.36	6.64	9.98	17.2	37.1	

										$c \times 0.025 \text{ mm}$	
1.4	8.25	12.6	16.4	22.4	35	71.4	206	285	620	1142	1511
2	5.78	8.82	11.5	15.6	24.6	50	144	200	364	800	1800
2.8	4.12	6.3	8.22	11.2	17.5	35.7	103	142	260	571	1285
4	2.89	4.41	5.76	7.84	12.3	25	72.2	100	182	400	900
5.6	2.06	3.18	4.11	5.6	8.78	17.8	51.6	71.4	130	288	642
8	1.44	2.20	2.88	3.92	6.12	12.8	36.1	50	91.1	200	450
11	1.05	1.60	2.09	2.85	4.45	9.09	26.2	36.3	66.2	145	327
16	0.72	1.10	1.44	1.96	3.06	6.25	18.0	25	45.6	100	225
22	0.52	0.80	1.04	1.42	2.22	4.94	13.1	18.1	33.1	72.7	165
32	0.36	0.55	0.72	0.98	1.63	3.12	9.03	12.5	22.7	50	112

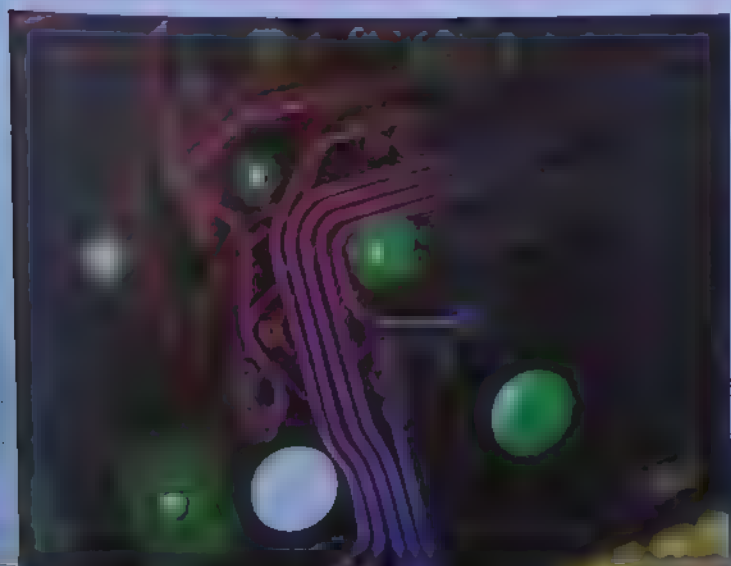
Reciprocity failure compensation

Film	Exposure time (seconds)					
	1/1000	1/500	1/250	1/125	1/60	1/30
EKTACHROME 160 and 160 (Daylight)	None No filter	None No filter	None No filter	+ 1/2 stop CC 10B	None	None
EKTACHROME 400 (Daylight)	None No filter	None No filter	None No filter	+ 1/2 stop No filter	+ 1 1/2 stops CC 10C	None
EKTACHROME 50 Professional (Daylight)	+ 1/2 stop CC 10G	None No filter	None No filter	None No filter	+ 1 stop CC 20B	None
EKTACHROME 200 and 200 Professional (Daylight)	None No filter	None No filter	None No filter	+ 1/2 stop CC 10R	+ 1 stop CC 10R	None
KODACHROME 400	None No filter	None No filter	None No filter	+ 1/2 stop No filter	+ 1 stop No filter	+ 2 stops No filter
KODACHROME 25 (Daylight)	None No filter	None No filter	None No filter	+ 1 stop CC 10M	+ 1 1/2 stops CC 10M	+ 2 1/2 stops CC 10M
KODACHROME 64 (Daylight)	None No filter	None No filter	None No filter	+ 1 stop CC 10R	Not recommended	Not recommended
KODACOLOR II	None No filter	None No filter	+ 1/2 stop CC 10C	+ 1/2 stop CC 15C	+ 1 1/2 stops CC 30C	+ 1 1/2 stops CC 30C

Close-up depth of field

Calculating depth of field is often important but never more so than in close-up work where the depth of field available at the working aperture is likely to be both small and very important. It is possible to make rough visual checks on depth of field at different apertures with most SLR and large format cameras but the darkened screen makes such estimates both difficult and crude. For crucial work it is best to refer to a table. The tables printed here show the depth of field available at different apertures and magnifications/reproduction ratios. One of the tables is based on a standard circle of confusion of 0.033 mm—the other uses a figure of 0.025 mm and is recommended for more critical work. In both cases the figures give the depth each side of the main focus—for total depth of field in mm double the figures.

Magn	0.1	0.13	0.17	0.2	0.25	0.33	0.5	0.67	1	1.5	2	2.5	3
f/11	1.10	1.0	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.15	0.1	0.07
2	2.20	2.00	1.80	1.60	1.40	1.20	1.0	0.8	0.6	0.4	0.3	0.2	0.15
2.8	3.30	3.00	2.70	2.40	2.10	1.80	1.5	1.2	0.9	0.6	0.4	0.3	0.2
4	4.40	4.00	3.60	3.20	2.80	2.40	2.0	1.6	1.2	0.8	0.5	0.4	0.3
5.6	5.50	5.00	4.50	4.00	3.50	3.00	2.5	2.0	1.5	1.0	0.7	0.5	0.4
8	6.60	6.00	5.40	4.80	4.20	3.60	3.0	2.4	1.8	1.2	0.8	0.6	0.5
11	7.70	7.00	6.30	5.60	4.90	4.20	3.5	2.8	2.1	1.4	1.0	0.7	0.6
16	8.80	8.00	7.20	6.40	5.60	4.80	4.0	3.2	2.4	1.6	1.1	0.8	0.7
22	9.90	9.00	8.10	7.20	6.30	5.40	4.5	3.6	2.7	1.8	1.2	0.9	0.8
32	11.00	10.00	9.00	8.00	7.00	6.00	5.0	4.0	3.0	2.0	1.3	1.0	0.9
45	12.10	11.00	10.00	9.00	8.00	7.00	6.0	4.8	3.6	2.4	1.6	1.1	1.0
64	13.20	12.00	11.00	10.00	9.00	8.00	7.0	5.6	4.2	2.8	1.9	1.3	1.1



Magn	0.1	0.13	0.17	0.2	0.25	0.33	0.5	0.67	1	1.5	2	2.5	3
f/16	1.10	1.0	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.15	0.1	0.07
2	2.20	2.00	1.80	1.60	1.40	1.20	1.0	0.8	0.6	0.4	0.3	0.2	0.15
2.8	3.30	3.00	2.70	2.40	2.10	1.80	1.5	1.2	0.9	0.6	0.4	0.3	0.2
4	4.40	4.00	3.60	3.20	2.80	2.40	2.0	1.6	1.2	0.8	0.5	0.4	0.3
5.6	5.50	5.00	4.50	4.00	3.50	3.00	2.5	2.0	1.5	1.0	0.7	0.5	0.4
8	6.60	6.00	5.40	4.80	4.20	3.60	3.0	2.4	1.8	1.2	0.8	0.6	0.5
11	7.70	7.00	6.30	5.60	4.90	4.20	3.5	2.8	2.1	1.4	1.0	0.7	0.6
16	8.80	8.00	7.20	6.40	5.60	4.80	4.0	3.2	2.4	1.6	1.1	0.8	0.7
22	9.90	9.00	8.10	7.20	6.30	5.40	4.5	3.6	2.7	1.8	1.2	0.9	0.8
32	11.00	10.00	9.00	8.00	7.00	6.00	5.0	4.0	3.0	2.0	1.3	1.0	0.9
45	12.10	11.00	10.00	9.00	8.00	7.00	6.0	4.8	3.6	2.4	1.6	1.1	1.0
64	13.20	12.00	11.00	10.00	9.00	8.00	7.0	5.6	4.2	2.8	1.9	1.3	1.1



Movie film running times and lengths

Movie film running times and lengths are given in the following table. The running times are given in minutes and seconds. The lengths are given in feet and inches. The running times are given in minutes and seconds. The lengths are given in feet and inches.

Film format	Super 8 (72 frames per foot)	16mm (40 frames per foot)		
Projection speed in frames per second	18	24	18	24
Running time and film length	Feet + frames	Feet + frames	Feet + frames	Feet + frames
Seconds				
1	0 - 18	0 - 24	0 - 18	0 - 24
2	0 - 36	0 - 48	0 - 36	0 - 48
3	0 - 54	1 - 0	1 - 14	1 - 32
4	1 - 0	1 - 24	1 - 32	2 - 16
5	1 - 18	1 - 48	2 - 10	3 - 0
6	1 - 36	2 - 0	2 - 28	3 - 24
7	1 - 54	2 - 24	3 - 6	4 - 8
8	2 - 0	2 - 48	3 - 24	4 - 32
9	2 - 18	3 - 0	4 - 2	5 - 16
10	2 - 36	3 - 24	4 - 20	6 - 0
20	5 - 0	6 - 48	9 - 0	12 - 0
30	7 - 36	10 - 0	13 - 20	18 - 0
40	10 - 0	13 - 24	18 - 0	24 - 0
Minutes				
1	15 - 0	20 - 0	27 - 0	36 - 0
2	30 - 0	40 - 0	54 - 0	72 - 0
3	45 - 0	60 - 0	81 - 0	108 - 0
4	60 - 0	80 - 0	108 - 0	144 - 0
5	75 - 0	100 - 0	135 - 0	180 - 0
6	90 - 0	120 - 0	162 - 0	216 - 0
7	105 - 0	140 - 0	189 - 0	252 - 0
8	120 - 0	160 - 0	216 - 0	288 - 0
9	135 - 0	180 - 0	243 - 0	324 - 0
10	150 - 0	200 - 0	270 - 0	360 - 0

Coloured sky The colour of the sky in this shot is due to reciprocity failure. This is one of the occasions when a cast is actually attractive, and so no filtration is needed

Evening light The colour temperature of the light source rarely matches the photographic standard of 5500K. But in some cases, such as at sunset, this is not a problem



Flash guide numbers

Flash guide numbers are a convenient way of expressing the power of a flash unit. They are used to determine the correct aperture and shutter speed for a given flash unit and subject distance. The guide number is a constant for a given flash unit and is expressed in feet or metres. The guide number is the product of the aperture and the distance to the subject. For example, if the guide number is 100, the aperture can be f/10 and the distance 10 metres, or f/20 and the distance 5 metres, or f/5 and the distance 20 metres.

25	50	64	80	100	160	200	400	BCPS	Joules (watt seconds)
6	9	10	11	12	16	18	25	300	8
7	10	11	12	14	18	20	28	375	10
8	11	12	14	16	20	22	32	450	12
9	12	14	16	18	22	25	35	600	16
10	14	16	18	20	25	28	40	750	20
11	16	18	20	22	28	32	45	900	25
12	18	20	22	25	32	35	50	1200	32
14	20	22	25	28	35	40	56	1500	40
16	22	25	28	32	40	45	64	1800	50
18	25	28	32	35	45	50	70	2400	64
20	28	32	35	40	50	56	80	3000	80
22	32	35	40	45	56	63	90	3600	100
25	35	40	45	50	63	70	100	4800	125
28	40	45	50	56	70	80	113	6000	160
32	45	50	56	63	80	90	128	7200	200

Sources

Light sources are classified by their colour temperature, which is a measure of the light's hue. The colour temperature is expressed in degrees Kelvin (K). The higher the colour temperature, the bluer the light. The colour temperature of a light source is a measure of the light's energy. The colour temperature of a light source is a measure of the light's energy. The colour temperature of a light source is a measure of the light's energy.

Colour temperature and mireds

If you want to get accurate colours in your transparencies it is essential to filter for different light sources. Working out the required filtration is easy if you have a colour temperature meter. Otherwise it is difficult to know what colour temperature a particular light source is. The table here gives a guide to the most common or important sources measured in kelvins. However, the exact colour of any lighting can be affected by the age of bulbs or tubes, the colour of reflectors or surrounding surfaces and so on. Nevertheless for all but the most critical conditions this guide should be sufficiently accurate.

To find the necessary filtration you can use the kelvin mired scale. Mireds (micro reciprocal degrees) are used because a filter can then be given a set value which applies to any region of the colour temperature range. For example, a filter with a mired shift value of 1 will change the colour temperature from 2500 to 2500 K, a shift of 500 K. But it can also change it from 5000 to 1000 K, a shift of 5000 K. So filters cannot simply be selected for colour temperature. The mired scale is derived by dividing the colour temperature into 1000000. Blue filters have negative mired values, and red, yellow and amber filters have positive values. Some colour temperature meters, such as the Munsell digital meter, give readings directly in mired values, which are then read off a table to find the correct filters to use. Some approximate mired values are given here for the most

common filters, but you should check with the filter's instructions. The point to remember about mireds is that a filter alters the mired value by the same amount whatever the light source, but the change in degrees kelvin varies with the colour temperature of the light.

Candle	1930
Sunrise/sunset	c 2000
40 watt domestic bulb	2650
75 watt domestic bulb	2820
100 watt domestic bulb	2900
200 watt domestic bulb	2980
500 watt photographic lamp	3200
Projector lamps	3200
500 watt photoflood	3400
Daylight fluorescent light	4500
Mean noon sunlight	5400
Photographic daylight	5500
Flashcube	5500
Blue flashbulb	6000
Electronic flash tube	6000
Average daylight (sun and sky)	6500
Colour matching fluorescent tube	6500
Overcast daylight	7500
Blue sky	10000 to 16000

Mired values for common filters

81	+ 10	82
81A	+ 15	82A
81B	+ 20	82B
81C	+ 30	82C
81D	+ 40	82D
81E	+ 50	82E
81F	+ 60	82F
81G	+ 70	82G
81H	+ 80	82H
81I	+ 90	82I
81J	+ 100	82J
81K	+ 110	82K
81L	+ 120	82L
81M	+ 130	82M
81N	+ 140	82N
81O	+ 150	82O
81P	+ 160	82P
81Q	+ 170	82Q
81R	+ 180	82R
81S	+ 190	82S
81T	+ 200	82T
81U	+ 210	82U
81V	+ 220	82V
81W	+ 230	82W
81X	+ 240	82X
81Y	+ 250	82Y
81Z	+ 260	82Z
81AA	+ 270	82AA
81AB	+ 280	82AB
81AC	+ 290	82AC
81AD	+ 300	82AD
81AE	+ 310	82AE
81AF	+ 320	82AF
81AG	+ 330	82AG
81AH	+ 340	82AH
81AI	+ 350	82AI
81AJ	+ 360	82AJ
81AK	+ 370	82AK
81AL	+ 380	82AL
81AM	+ 390	82AM
81AN	+ 400	82AN
81AO	+ 410	82AO
81AP	+ 420	82AP
81AQ	+ 430	82AQ
81AR	+ 440	82AR
81AS	+ 450	82AS
81AT	+ 460	82AT
81AU	+ 470	82AU
81AV	+ 480	82AV
81AW	+ 490	82AW
81AX	+ 500	82AX
81AY	+ 510	82AY
81AZ	+ 520	82AZ
81BA	+ 530	82BA
81BB	+ 540	82BB
81BC	+ 550	82BC
81BD	+ 560	82BD
81BE	+ 570	82BE
81BF	+ 580	82BF
81BG	+ 590	82BG
81BH	+ 600	82BH
81BI	+ 610	82BI
81BJ	+ 620	82BJ
81BK	+ 630	82BK
81BL	+ 640	82BL
81BM	+ 650	82BM
81BN	+ 660	82BN
81BO	+ 670	82BO
81BP	+ 680	82BP
81BQ	+ 690	82BQ
81BR	+ 700	82BR
81BS	+ 710	82BS
81BT	+ 720	82BT
81BU	+ 730	82BU
81BV	+ 740	82BV
81BW	+ 750	82BW
81BX	+ 760	82BX
81BY	+ 770	82BY
81BZ	+ 780	82BZ
81CA	+ 790	82CA
81CB	+ 800	82CB
81CC	+ 810	82CC
81CD	+ 820	82CD
81CE	+ 830	82CE
81CF	+ 840	82CF
81CG	+ 850	82CG
81CH	+ 860	82CH
81CI	+ 870	82CI
81CJ	+ 880	82CJ
81CK	+ 890	82CK
81CL	+ 900	82CL
81CM	+ 910	82CM
81CN	+ 920	82CN
81CO	+ 930	82CO
81CP	+ 940	82CP
81CQ	+ 950	82CQ
81CR	+ 960	82CR
81CS	+ 970	82CS
81CT	+ 980	82CT
81CU	+ 990	82CU
81CV	+ 1000	82CV
81CW	+ 1010	82CW
81CX	+ 1020	82CX
81CY	+ 1030	82CY
81CZ	+ 1040	82CZ
81DA	+ 1050	82DA
81DB	+ 1060	82DB
81DC	+ 1070	82DC
81DD	+ 1080	82DD
81DE	+ 1090	82DE
81DF	+ 1100	82DF
81DG	+ 1110	82DG
81DH	+ 1120	82DH
81DI	+ 1130	82DI
81DJ	+ 1140	82DJ
81DK	+ 1150	82DK
81DL	+ 1160	82DL
81DM	+ 1170	82DM
81DN	+ 1180	82DN
81DO	+ 1190	82DO
81DP	+ 1200	82DP
81DQ	+ 1210	82DQ
81DR	+ 1220	82DR
81DS	+ 1230	82DS
81DT	+ 1240	82DT
81DU	+ 1250	82DU
81DV	+ 1260	82DV
81DW	+ 1270	82DW
81DX	+ 1280	82DX
81DY	+ 1290	82DY
81DZ	+ 1300	82DZ
81EA	+ 1310	82EA
81EB	+ 1320	82EB
81EC	+ 1330	82EC
81ED	+ 1340	82ED
81EE	+ 1350	82EE
81EF	+ 1360	82EF
81EG	+ 1370	82EG
81EH	+ 1380	82EH
81EI	+ 1390	82EI
81EJ	+ 1400	82EJ
81EK	+ 1410	82EK
81EL	+ 1420	82EL
81EM	+ 1430	82EM
81EN	+ 1440	82EN
81EO	+ 1450	82EO
81EP	+ 1460	82EP
81EQ	+ 1470	82EQ
81ER	+ 1480	82ER
81ES	+ 1490	82ES
81ET	+ 1500	82ET
81EU	+ 1510	82EU
81EV	+ 1520	82EV
81EW	+ 1530	82EW
81EX	+ 1540	82EX
81EY	+ 1550	82EY
81EZ	+ 1560	82EZ
81FA	+ 1570	82FA
81FB	+ 1580	82FB
81FC	+ 1590	82FC
81FD	+ 1600	82FD
81FE	+ 1610	82FE
81FF	+ 1620	82FF
81FG	+ 1630	82FG
81FH	+ 1640	82FH
81FI	+ 1650	82FI
81FJ	+ 1660	82FJ
81FK	+ 1670	82FK
81FL	+ 1680	82FL
81FM	+ 1690	82FM
81FN	+ 1700	82FN
81FO	+ 1710	82FO
81FP	+ 1720	82FP
81FQ	+ 1730	82FQ
81FR	+ 1740	82FR
81FS	+ 1750	82FS
81FT	+ 1760	82FT
81FU	+ 1770	82FU
81FV	+ 1780	82FV
81FW	+ 1790	82FW
81FX	+ 1800	82FX
81FY	+ 1810	82FY
81FZ	+ 1820	82FZ
81GA	+ 1830	82GA
81GB	+ 1840	82GB
81GC	+ 1850	82GC
81GD	+ 1860	82GD
81GE	+ 1870	82GE
81GF	+ 1880	82GF
81GG	+ 1890	82GG
81GH	+ 1900	82GH
81GI	+ 1910	82GI
81GJ	+ 1920	82GJ
81GK	+ 1930	82GK
81GL	+ 1940	82GL
81GM	+ 1950	82GM
81GN	+ 1960	82GN
81GO	+ 1970	82GO
81GP	+ 1980	82GP
81GQ	+ 1990	82GQ
81GR	+ 2000	82GR
81GS	+ 2010	82GS
81GT	+ 2020	82GT
81GU	+ 2030	82GU
81GV	+ 2040	82GV
81GW	+ 2050	82GW
81GX	+ 2060	82GX
81GY	+ 2070	82GY
81GZ	+ 2080	82GZ
81HA	+ 2090	82HA
81HB	+ 2100	82HB
81HC	+ 2110	82HC
81HD	+ 2120	82HD
81HE	+ 2130	82HE
81HF	+ 2140	82HF
81HG	+ 2150	82HG
81HH	+ 2160	82HH
81HI	+ 2170	82HI
81HJ	+ 2180	82HJ
81HK	+ 2190	82HK
81HL	+ 2200	82HL
81HM	+ 2210	82HM
81HN	+ 2220	82HN
81HO	+ 2230	82HO
81HP	+ 2240	82HP
81HQ	+ 2250	82HQ
81HR	+ 2260	82HR
81HS	+ 2270	82HS
81HT	+ 2280	82HT
81HU	+ 2290	82HU
81HV	+ 2300	82HV
81HW	+ 2310	82HW
81HX	+ 2320	82HX
81HY	+ 2330	82HY
81HZ	+ 2340	82HZ
81IA	+ 2350	82IA
81IB	+ 2360	82IB
81IC	+ 2370	82IC
81ID	+ 2380	82ID
81IE	+ 2390	82IE
81IF	+ 2400	82IF
81IG	+ 2410	82IG
81IH	+ 2420	82IH
81II	+ 2430	82II
81IJ	+ 2440	82IJ
81IK	+ 2450	82IK
81IL	+ 2460	82IL
81IM	+ 2470	82IM
81IN	+ 2480	82IN
81IO	+ 2490	82IO
81IP	+ 2500	82IP
81IQ	+ 2510	82IQ
81IR	+ 2520	82IR
81IS	+ 2530	82IS
81IT	+ 2540	82IT
81IU	+ 2550	82IU
81IV	+ 2560	82IV
81IW	+ 2570	82IW
81IX	+ 2580	82IX
81IY	+ 2590	82IY
81IZ	+ 2600	82IZ
81JA	+ 2610	82JA
81JB	+ 2620	82JB
81JC	+ 2630	82JC
81JD	+ 2640	82JD
81JE	+ 2650	82JE
81JF	+ 2660	82JF
81JG	+ 2670	82JG
81JH	+ 2680	82JH
81JI	+ 2690	82JI
81JJ	+ 2700	82JJ
81JK	+ 2710	82JK
81JL	+ 2720	82JL
81JM	+ 2730	82JM
81JN	+ 2740	82JN
81JO	+ 2750	82JO
81JP	+ 2760	82JP
81JQ	+ 2770	82JQ
81JR	+ 2780	82JR
81JS	+ 2790	82JS
81JT	+ 2800	82JT
81JU	+ 2810	82JU
81JV	+ 2820	82JV
81JW	+ 2830	82JW
81JX	+ 2840	82JX
81JY	+ 2850	82JY
81JZ	+ 2860	82JZ
81KA	+ 2870	82KA
81KB	+ 2880	82KB
81KC	+ 2890	82KC
81KD	+ 2900	82KD
81KE	+ 2910	82KE
81KF	+ 2920	82KF
81KG	+ 2930	82KG
81KH	+ 2940	82KH
81KI	+ 2950	82KI
81KJ	+ 2960	82KJ
81KK	+ 2970	82KK
81KL	+ 2980	82KL
81KM	+ 2990	82KM
81KN	+ 3000	82KN
81KO	+ 3010	82KO
81KP	+ 3020	82KP
81KQ	+ 3030	82KQ
81KR	+ 3040	82KR
81KS	+ 3050	82KS
81KT	+ 3060	82KT
81KU	+ 3070	82KU
81KV	+ 3080	82KV
81KW	+ 3090	82KW
81KX	+ 3100	82KX
81KY	+ 3110	82KY
81KZ	+ 3120	82KZ
81LA	+ 3130	82LA
81LB	+ 3140	82LB
81LC	+ 3150	82LC
81LD	+ 3160	82LD
81LE	+ 3170	82LE
81LF	+ 3180	82LF
81LG	+ 3190	82LG
81LH	+ 3200	82LH
81LI	+ 3210	82LI
81LJ	+ 3220	82LJ
81LK	+ 3230	82LK
81LL	+ 3240	82LL
81LM	+ 3250	82LM
81LN	+ 3260	82LN
81LO	+ 3270	82LO
81LP	+ 3280	82LP
81LQ	+ 3290	82LQ
81LR	+ 3300	82LR
81LS	+ 3310	82LS
81LT	+ 3320	82LT
81LU	+ 3330	82LU
81LV	+ 3340	82LV
81LW	+ 3350	82LW
81LX	+ 3360	82LX
81LY	+ 3370	82LY
81LZ	+ 3380	82LZ
81MA	+ 3390	82MA
81MB	+ 3400	82MB
81MC	+ 3410	82MC
81MD	+ 3420	82MD
81ME	+ 3430	82ME
81MF	+ 3440	82MF
81MG	+ 3450	82MG
81MH	+ 3460	82MH
81MI	+ 3470	82MI
81MJ	+ 3480	82MJ
81MK	+ 3490	82MK
81ML	+ 3500	82ML
81MN	+ 3510	82MN
81MO	+ 3520	82MO
81MP	+ 3530	82MP
81MQ	+ 3540	82MQ
81MR	+ 3550	82MR
81MS	+ 3560	82MS
81MT	+ 3570	82MT
81MU	+ 3580	82MU
81MV	+ 3590	82MV
81MW	+ 3600	82MW
81MX	+ 3610	82MX
81MY	+ 3620	82MY
81MZ	+ 3630	82MZ
81NA	+ 3640	82NA
81NB	+ 3650	82NB
81NC	+ 3660	82NC
81ND	+ 3670	82ND
81NE	+ 3680	82NE
81NF	+ 3690	82NF
81NG	+ 3700	82NG
81NH	+ 3710	82NH
81NI	+ 3720	82NI
81NJ	+ 3730	82NJ
81NK	+ 3740	82NK
81NL	+ 3750	82NL
81NN	+ 3760	82NN
81NO	+ 3770	82NO
81NP	+ 3780	82NP
81NQ	+ 3790	82NQ
81NR	+ 3800	82NR
81NS	+ 3810	82NS
81NT	+ 3820	82NT
81NU	+ 3830	82NU
81NV	+ 3840	82NV
81NW	+ 3850	82NW
81NX	+ 3860	82NX
81NY	+ 3870	82NY
81NZ	+ 3880	82NZ
81OA	+ 3890	82OA
81OB	+ 3900	82OB
81OC	+ 3910	82OC
81OD	+ 3920	82OD
81OE	+ 3930	82OE
81OF	+ 3940	82OF
81OG	+ 3950	82OG
81OH	+ 3960	82OH
81OI	+ 3970	82OI
81OJ	+ 3980	82OJ
81OK	+ 3990	82OK
81OL	+ 4000	82OL
81OM	+ 4010	82OM
81ON	+ 4020	82ON
81OO	+ 4030	82OO
81OP	+ 4040	82OP
81OQ	+ 4050	82OQ
81OR	+ 4060	82OR
81OS	+ 4070	82OS
81OT	+ 4080	82OT
81OU	+ 4090	82OU
81OV	+ 4100	82OV
81OW	+ 4110	82OW
81OX	+ 4120	82OX
81OY	+ 4130	

Hints and tips

Many of the useful little tricks in photography you can learn only by experience. So we asked a few professionals to pass on a few hints and tips on how they save time, money and frustration by little changes to their equipment

Put on a yellow band. When you're out shooting, you'll be carrying a lot of equipment. To make it easier to find, put a yellow band on the handle of your camera and lens.

Put on a yellow band. When you're out shooting, you'll be carrying a lot of equipment. To make it easier to find, put a yellow band on the handle of your camera and lens.

Put on a yellow band. When you're out shooting, you'll be carrying a lot of equipment. To make it easier to find, put a yellow band on the handle of your camera and lens.



Roger P. Young

Put on a yellow band. When you're out shooting, you'll be carrying a lot of equipment. To make it easier to find, put a yellow band on the handle of your camera and lens.

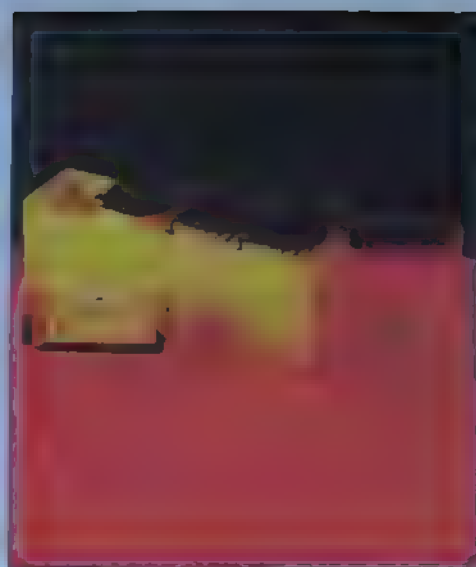
Put on a yellow band. When you're out shooting, you'll be carrying a lot of equipment. To make it easier to find, put a yellow band on the handle of your camera and lens.

Put on a yellow band. When you're out shooting, you'll be carrying a lot of equipment. To make it easier to find, put a yellow band on the handle of your camera and lens.

Put on a yellow band. When you're out shooting, you'll be carrying a lot of equipment. To make it easier to find, put a yellow band on the handle of your camera and lens.

Put on a yellow band. When you're out shooting, you'll be carrying a lot of equipment. To make it easier to find, put a yellow band on the handle of your camera and lens.

Put on a yellow band. When you're out shooting, you'll be carrying a lot of equipment. To make it easier to find, put a yellow band on the handle of your camera and lens.



The most compact way to transport 35 mm films safely is to store them in standard Kodachrome slide boxes. Alternatively, keep your 35 mm film in its original container, but use the type with a window.

For fashion shots, use a lens with a wide aperture and a slow shutter speed to create a sense of motion. Use a tripod to keep the camera steady.

Always have plenty of film on hand. Buy a second camera, even if it's expensive, to use as a backup. It's better to have a spare than to run out of film.

Buy a good Swiss Army knife—the type with a screwdriver. It could easily become your most useful photographic accessory.

Hard cases give equipment the best protection but are less accessible than soft bags. Some professionals use a large hard case to take the equipment they think they might need to a shoot and a smaller bag for taking the equipment they actually do need on the shoot.



Simple colour tape, made of thin, clear plastic, can be used to protect the lens of a camera. It's easy to apply and remove.

When you're out shooting, you'll be carrying a lot of equipment. To make it easier to find, put a yellow band on the handle of your camera and lens.

When you're out shooting, you'll be carrying a lot of equipment. To make it easier to find, put a yellow band on the handle of your camera and lens.

When you're out shooting, you'll be carrying a lot of equipment. To make it easier to find, put a yellow band on the handle of your camera and lens.

When you're out shooting, you'll be carrying a lot of equipment. To make it easier to find, put a yellow band on the handle of your camera and lens.



When you're out shooting, you'll be carrying a lot of equipment. To make it easier to find, put a yellow band on the handle of your camera and lens.

When you're out shooting, you'll be carrying a lot of equipment. To make it easier to find, put a yellow band on the handle of your camera and lens.

When you're out shooting, you'll be carrying a lot of equipment. To make it easier to find, put a yellow band on the handle of your camera and lens.

When you're out shooting, you'll be carrying a lot of equipment. To make it easier to find, put a yellow band on the handle of your camera and lens.

When you're out shooting, you'll be carrying a lot of equipment. To make it easier to find, put a yellow band on the handle of your camera and lens.



World of photography

STYLES OF PHOTOGRAPHY

A variety of different and often highly individual styles can be found in almost every kind of photographic work—ranging from photojournalism to fashion and advertising.



Photojournalism is a style of photography that aims to tell a story through a single image. It is often used in news reporting and documentary work. Photojournalists often work in fast-paced environments and must be able to capture a moment of truth in a split second.

Portrait photography is a style of photography that focuses on capturing the personality and essence of a person. It can be done in a variety of settings, from formal studio portraits to candid street portraits. Portrait photographers often use a variety of techniques to create a compelling image.

Palestinian women, Ramat, 1982 A woman wearing a headscarf and a black jacket. She is looking towards the camera. The background is a blurred outdoor setting.



the figure is seen from the back, and the light from the window behind him creates a strong silhouette effect. The image is very dark and grainy, with a high contrast between the dark figure and the bright light outside. The overall mood is mysterious and evocative.

January 1st, 1972, Martinique One of Kertész's favourite pictures, its success lies in its enigmatic quality which leaves the viewer puzzling about the figure



The open door A disturbing and slightly surreal image taken from Gibson's book 'The Somnambulist' in which he frequently uses elements of metaphor and symbol

Hands, 1931 Man Ray was a leading member of the Surrealist movement of the 1930s—he was one of the first photographers to exploit solarization





Secessionists (see page 160) who wanted to show that photography could be a fine art. The pictorialists rejected the idea that the subject matter and detail were all important. Laying to one side the narrow-minded attitude current in photography as art, they wanted to place more emphasis on the mood and feeling expressed by a photograph. This movement was undoubtedly the most important influence on photography's acceptance as a fine art in its own right.

But like so many revolutionary movements, pictorialism was to be rejected in its turn. This time by the trend in the 1930s towards a more realistic photographic style. This was particularly shown in the work of Earl Strand and Edward Weston and the f64 Group (see page 200).

The emergence of such a style was also influenced by the enormous improvements in photographic equipment and techniques, and the revolutionary movements in modern art. The most distinguishing characteristics were its choice of an often commonplace subject matter – which might range from manufactured objects to details of plant and natural forms – and the highly detailed realistic treatment of these subjects. Although taken for granted nowadays, this was an extraordinarily revolutionary development in the 1920s.

The great explosion of interest in photography in the early 20th century and its subsequent development as one of the most widely practised arts led in turn to the development of an immense

Flying machine This picture for the 1975 Philips Calendar is typical of Sarah Moon's use of soft focus and sepia printing to heighten the sense of nostalgia

New York, 1946 (below) One of the many bizarre and humorous pictures of dogs which Erwitl took over a long period and published in his book 'Son of Bitch'



variety of styles.

Often styles that seem to have opposed each other have developed side by side over the years. Perhaps the best example of the late 19th-century style is Sarah Moon who is famous for her highly romanticised and often dreamlike compositions (see page 111). Nevertheless, it is hard to resist

the temptation to look at the work of photographers like Erwitl and Moon in the light of the work of the 19th-century pictorialists. The latter were concerned with the mood and feeling of their pictures, and the former with the sense of nostalgia. The latter were concerned with the subject matter and detail, and the former with the sense of nostalgia.



Franco Fontana/The Image Bank

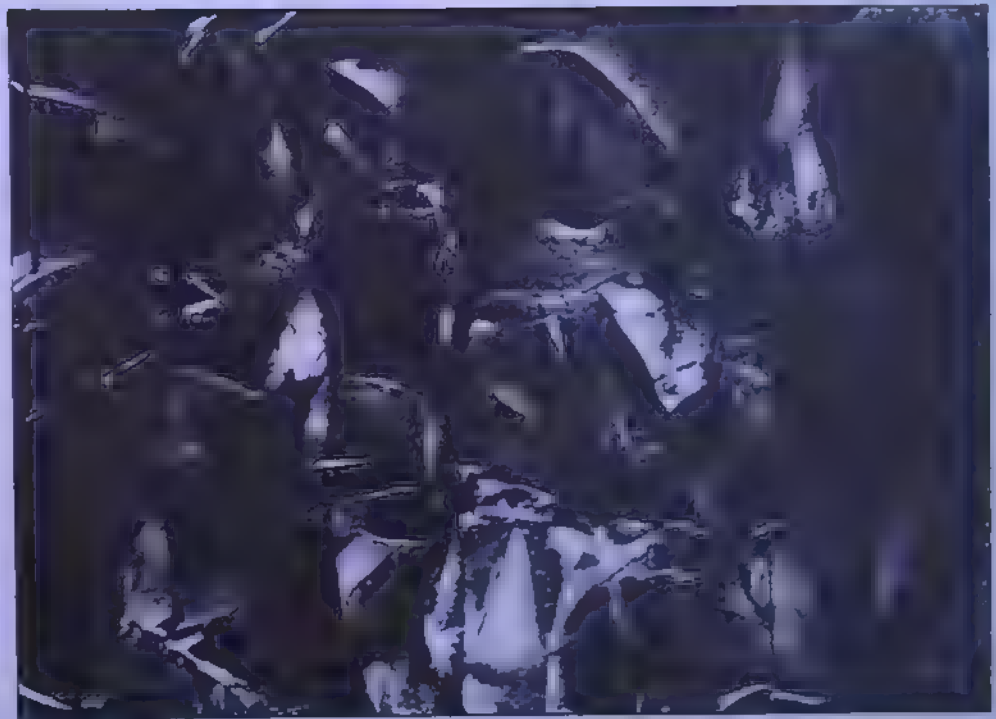
Landscape Fontana's landscapes are instantly recognizable for their broad, flat sweeps of colour. The pictures are not abstract, but highlight a new aspect of the landscape

Rock wall, West Hartford, Connecticut, 1959. Caponigro's style of photography tries to capture some of the emotions that natural forms can evoke

approaches ranged from the deliberate manipulation of an image in the darkroom to produce abstract forms to the deliberate framing of a subject to portray abstraction. This was done, for example, by photographing from unusual angles, or by taking close-ups, reflections or patterns of light and shade.

These have included some of Man Ray's solarized images, the distorted nudes produced by André Kertész and Bill Brandt, and Andreas Feininger's extreme close-ups of the complex shapes contained within rocks or shells. More recently they include the remarkable range of colour work produced by Franco Fontana, whose pictures transform landscapes into broad bands and sweeps of colour by using the light and a long lens to flatten perspective (see page 1380).

The extremes of Surrealism and Abstraction are examples of 'photography as art' in its purest form and are examples of ideas developed purely as a means of self-expression. Even so, these



Paul Caponigro/photograph courtesy of Victoria & Albert Museum

ideas are frequently taken up and used or expanded by advertising photographers in their work. A leading example of this is in the style of the Benson and Hedges cigarette adverts in the UK, but these influences can also be seen in innumerable other advertising photographs.

Another related style of photography deals mainly in symbols and metaphors — on the face of it, the photographs are of one thing, but there is a deeper meaning which you have to search for. Photographers use this approach as an indirect way of expressing themselves and even in advertising photography you

can recognise elements of symbolism and metaphor.

One of the most famous of all photographers to adopt a metaphoric approach—that is taking pictures of particular subjects

above and beyond

American Photo

Steiglitz Steiglitz

different mood

his photographs

Minor White's detailed

nature and form

expressing an inner

himself as the

such meaning

image

Other photographers use metaphor and symbolism in a far more subtle manner. Wynn Bullock, for example, draws attention to the overtones of natural forms such as the lines and figures to be seen in trees, rocks and landscapes. Duane Michals also likes to use symbols in his work. For example, he often presents his viewer with series of photographs which tell a story, and of some intimate detail of life. These stories often contain a surreal element, such as a blurred figure which reappears in each image like a ghost. These series have an intimacy about them that attracts the viewer, but the strange element leaves his viewer puzzled and disturbed.

Another photographer who uses elements of symbolism, metaphor and abstraction in his work is Ralph Gibson. Gibson's tightly cropped photographs of people depersonalise them so that they become abstractions which concentrate on details of texture and pattern. In other photographs Gibson uses symbols and surreal elements to confront and question his viewers.

Styles of photography run parallel to the artistic movements and ideas of this century. Most of them are also devices used by photographers to express very personal and often restricted ideas about the world. They also generally have no other function than to please the photographer and express his thoughts and ideas—in forms that may range from the obvious to the extremely obscure.

Two more easily distinguishable photographic styles are the Romantic and the Dramatic, which are often found combined in the work of one photographer. And unlike the styles of art photography, these styles are more often to be found in a more commercial type of photography—particularly in portraiture and fashion.

In this style the photographer generally intends to convey mood, emotions, and a sense of context. The elements of the picture are carefully chosen to give, usually, a sense of elegance and glamour, and they are generally shot in the studio.

The heyday of this style of photography was in the 1930s. At this time portrait photographs were at their most popular, with clients demanding and receiving the utmost flattery. Another significant influence was in the demands



Brave face In advertising shots like this the style of the photography is often dictated by the image of the product being advertised and the art director often chooses a photographer for his or her style

of the fashion magazines such as *Vogue*, *Harper's Bazaar* and *Vanity Fair*—all of which wanted to promote glamour. Some of the most gifted exponents of this style were the fashion and portrait photographers Baron de Meyer, Yousuf Karsh and, most remarkably, Cecil Beaton (see page 716). Both de Meyer and Beaton used theatrical effect, often with elaborately constructed sets. Karsh, on

the other hand, was primarily a portrait photographer who used dramatic key lighting to reveal the characters of some of the most famous figures of the 1940s and 1950s.

This style was extremely popular in its time, but when the emphasis shifted away from glamour and elegance to the more straightforward styles of the 1960s it began to seem extremely over-contrived and dated.

However, the affection for the romantic did not disappear entirely and its influence can be seen particularly in the soft-focus, muted colours in such photographers as David Hamilton and



Sarah Moon In all these styles of photography, the style itself is usually an extremely important, if not the most important, component of the picture. In direct contrast is the documentary approach, which is primarily concerned with the subject itself. In theory this type of photography should be totally objective, but in practice individual photographers will contribute something of themselves to the picture. Such features as the choice of subject, the selection of a particular grouping or facial expression, and the use of the subject's environment all contribute towards a personal style.

Photographers have been using their cameras to document the world ever since the invention of photography but it is only in the last few decades that documentary photography has been recognised as having a clearly creative element. Nevertheless, such early documentary photographers as John Thomson, Lewis Hine and Jacob Riis all had a very distinctive style and the work of the great documentary photographers of the 1930s and 1940s has endured far beyond the events that they portrayed.

Although they were not individually recognized at the time outside the narrow world of photo-journalism, the

documentary approach has since become one of the most important and influential in the world of photography.

documentary
approach for
celebrity

documentary
approach for
celebrity

Operating as an international team, they quickly became famous for the quality of their human-interest photography. Among their most famous have been Cartier-Bresson, Marc Riboud, Eve Arnold, W. Eugene Smith and Philip Jones-Griffiths (see page 112).

The documentary approach has also been used to great effect in portraiture, notably by such photographers as Arnold Newman, Bill Brandt and the young British photographer, Brian Griffin.

All of these photographers employ a highly individual style in portraiture. Newman's effective positions not only focus attention on his sitters but also tell us something about their backgrounds. Brandt, on the other hand, tries to use the natural tension of a photo session to bring out a particular aspect of his sitter's character. Many of his subjects gaze out of the frame with wary or suspicious expressions. Brandt may also heighten this feeling by using an unusual angle or perspective. Griffin too often uses unusual angles or lighting in his striking portraits of executives.

The distinctive style of these photographers makes it very easy to identify their work. And this is also true of many photographers working in completely different fields such as advertising, fashion, photojournalism and travel. Indeed many rely on their distinctive style to bring them work. Even so there are many successful photographers who deliberately set out to take photographs in a universal style. An example of this is the so-called 'chocolate box' style of photography where the photographer makes no attempt to stamp his or her own personality on the picture.

This kind of photography is taken for its popular appeal and, like the Romantic style of photography, it often tends to reinforce commonly-held sentiments about how the world should look. Many individual styles on the other hand tend to challenge such beliefs and may inspire dislike or even hatred before becoming established as an acceptable way of seeing.

Clive Arrowsmith/taken for Mary Quant "Brave Face" poster/Colin Dickinson, Pearce & Partners Ltd

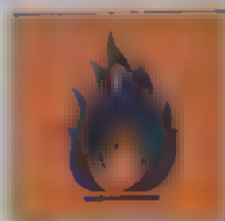
DATA

Darkroom

DARKROOM DETAILS

A quick and easy guide to the many different darkroom techniques you can try, plus tables of useful conversions, and pointers on chemical and darkroom safety

Chemical safety



Removing stains from dishes and clothes



Conversion tables—metric to English American

Volume

Milli- litres	UK fl oz	US fl oz	Litres	UK gallons	US gallons
1	0.035	0.034	1	0.26	0.26
2	0.070	0.068	2	0.52	0.52
3	0.106	0.102	3	0.78	0.78
4	0.141	0.135	4	1.04	1.04
5	0.176	0.169	5	1.30	1.30
6	0.211	0.203	6	1.56	1.56
7	0.246	0.237	7	1.82	1.82
8	0.282	0.271	8	2.08	2.08
9	0.317	0.304	9	2.34	2.34
10	0.352	0.338	10	2.60	2.60
25	0.881	0.845	25	6.50	6.50
50	1.76	1.69	50	11.0	13.2
75	2.64	2.54	75	16.5	19.8
100	3.52	3.38	100	22.0	26.4
250	8.80	8.45			
500	17.6	16.9			
750	26.4	25.4			
1000	35.2	33.8			

Mass

Grams	Grains	Ounces	Kilo- grams	Pounds
1	15.4	0.00035	0.001	0.0022
2	30.8	0.00070	0.002	0.0044
3	46.2	0.00105	0.003	0.0066
4	61.6	0.00140	0.004	0.0088
5	77.0	0.00175	0.005	0.0110
6	92.4	0.00210	0.006	0.0132
7	107.8	0.00245	0.007	0.0154
8	123.2	0.00280	0.008	0.0176
9	138.6	0.00315	0.009	0.0198
10	154.0	0.00350	0.010	0.0220
25	385.0	0.00875	0.025	0.0550
50	770.0	0.0175	0.050	0.1100
75	1155.0	0.02625	0.075	0.1650
250	3850.0	0.0875	0.250	0.5500
750	11550.0	0.2625	0.750	1.6500
1000	15432.0	0.354	1.000	2.2046

Linear measure (Metric to English)

Millimetres	Inches	Centimetres	Inches
1	0.039	1	0.394
2	0.079	2	0.787
3	0.118	3	1.18
4	0.157	4	1.57
5	0.197	5	1.97
6	0.236	6	2.36
7	0.276	7	2.76
8	0.315	8	3.15
9	0.354	9	3.54
10	0.394	10	3.94
		11	4.33
		12	4.72
		13	5.12
		14	5.51
		15	5.91
		16	6.30
		17	6.69
		18	7.09
		19	7.48
		20	7.87
		25	9.84
		30	11.8
		40	15.7
		50	19.7
		60	23.6
		70	27.6
		80	31.5
		90	35.4
		100	39.4

Metres	Feet
1/4	0.820
1/2	1.64
3/4	2.46
1	3.28
1 1/4	4.10
1 1/2	4.92
1 3/4	5.74
2	6.56
2 1/4	7.38
2 1/2	8.20
2 3/4	9.02
3	9.84
3 1/4	10.66
3 1/2	11.48
3 3/4	12.30
4	13.12
4 1/4	13.94
4 1/2	14.76
4 3/4	15.58
5	16.4
5 1/4	17.22
5 1/2	17.99
5 3/4	18.76
6	19.7
6 1/4	20.47
6 1/2	21.24
6 3/4	22.01
7	22.8
7 1/4	23.57
7 1/2	24.34
7 3/4	25.11
8	26.2
8 1/4	26.97
8 1/2	27.74
8 3/4	28.51
9	29.5
9 1/4	30.27
9 1/2	31.04
9 3/4	31.81
10	32.8

Area measure

Square centimetres	Square inches	Square metres	Square feet
1	0.155	1	10.76
2	0.310	2	21.52
3	0.465	3	32.28
4	0.620	4	43.04
5	0.775	5	53.80
6	0.930	6	64.56
7	1.09	7	75.32
8	1.24	8	86.08
9	1.40	9	96.84
10	1.55	10	107.64

Temperature

C	F	C	F	C	F	C	F	C	F
0	32.0	21	69.8	42	108.4	63	147.4	84	183.2
1	33.8	22	71.6	43	109.4	64	149.1	85	185.0
2	35.6	23	73.4	44	111.2	65	150.2	86	186.8
3	37.4	24	75.2	45	113.0	66	151.8	87	188.6
4	39.2	25	77.0	46	114.8	67	153.0	88	190.4
5	41.0	26	78.8	47	116.6	68	154.4	89	192.2
6	42.8	27	80.6	48	118.4	69	155.7	90	194.0
7	44.6	28	82.4	49	120.2	70	156.8	91	195.8
8	46.4	29	84.2	50	122.0	71	158.0	92	197.6
9	48.2	30	86.0	51	123.8	72	159.2	93	199.4
10	50.0	31	87.8	52	125.6	73	160.4	94	201.2
11	51.8	32	89.6	53	127.4	74	161.7	95	203.0
12	53.6	33	91.4	54	129.2	75	162.8	96	204.8
13	55.4	34	93.2	55	131.0	76	164.0	97	206.6
14	57.2	35	95.0	56	132.8	77	165.2	98	208.4
15	59.0	36	96.8	57	134.6	78	166.4	99	210.2
16	60.8	37	98.6	58	136.4	79	167.7	100	212.0
17	62.6	38	100.4	59	138.2	80	168.8		
18	64.4	39	102.2	60	140.0	81	169.8		
19	66.2	40	104.0	61	141.8	82	170.9		
20	68.0	41	105.8	62	143.6	83	172.0		

Conversion factors

inches cm	3.54	cm inches	0.3937
feet m	0.3048	m feet	3.2808
UK fluid oz ml	28.41	ml UK fluid oz	0.3552
US fluid oz ml	29.57	ml US fluid oz	0.3388
UK gallons l	4.546	l UK gallons	0.22
grams g	0.0648	g grains	15.432
ounces g	28.35	g ounces	0.3523
pounds kg	0.4536	kg pounds	2.2047

Basic Photography Techniques



Agfacontour is a simple but effective way of controlling contrast in a print. The paper is used to mask the highlights and shadows of the original image.

Print contrast control At the very start of the print making process, you can control the way tones are reproduced in the negative and influence picture mood.

Simple toning Colour dyes and simple chemical mixes can be used to tone the metallic surface of a black and white print into, for example, sepia, blue or copper hues. With care you can even apply tones selectively to a small area of the print, though this is more difficult.

Combination prints use image components from at least two different negatives (or slides) which are printed on to the same sheet of paper. The same effects can be achieved by multiple exposure but you have more control.

Tone elimination This technique turns the continuous tones of a colour or b & w original into black or white. Lith film is used to produce working size 'negatives', the start of many other derivations.

Printing control techniques can be introduced during the first stages of enlarging to correct or alter sharpness, distortion, dodging, masking and diffusion.

Solarization is the common (inaccurate) name of the Sabattier Effect technique which distorts tones and colours of film or paper which is re-exposed part way through development.

Printing on various materials For a wide range of effects, you can print on a variety of materials. The most common are paper, card, metal, glass, plastic and fabric.

Paper negative PLATE STAGES AND CONCEPTS

Texture screens Home-made or commercial screens can be used to create a range of textures in a print. The most common are paper, card, metal, glass, plastic and fabric.



Bas relief, a very simple technique, is a way of creating a three-dimensional effect in a print. The original image is first applied to a transparent material, then the background is removed.

Photo drawings An ordinary b & w photograph can be reduced to the form of a drawing simply by overtracing in waterproof ink before bleaching away the image.

Photograms Shadow effects can be obtained by placing solid transparent or translucent objects on a sheet of b & w or colour print paper or film.

Combinations in colour By refining the techniques of masking—perhaps by using a home-made masking jig—combination prints in colour are also possible.

Artistic and technical The most common are paper, card, metal, glass, plastic and fabric.

Special effects The most common are paper, card, metal, glass, plastic and fabric.

B & W reversal processes The most common are paper, card, metal, glass, plastic and fabric.

Black to white processes The most common are paper, card, metal, glass, plastic and fabric.

Handcolouring A range of techniques can be used to add touches of colour to a black and white print. The most common are paper, card, metal, glass, plastic and fabric.



Using colour print film If you use colour printing paper, try to make large transparencies for use in your portfolio.

Color-Key Thin sheets of sensitive film, used like lith but exposed by UV light, which is available in a wide range of colors, can be used to create posterization effects by simple contact printing.

Creative photocopying Large-size contact or high separation negatives can be used in various types of copier to produce unique images in b & w or colour.

Colour from b & w By using an ordinary b & w original in place of a colour negative, and suitable filtration, subtle or intense coloured positives can be produced.

Etch bleach The most common are paper, card, metal, glass, plastic and fabric.



Photo by [Name]

Advanced printing processes



Tone-line can be used for both colour and b & w to produce line drawings photographically which can also be combined with the original for key-line effects

Colour posterization Using tone and colour separation negatives and drop masks, together or separately, for printing different colours, to distort colour

Controlled solarization is a method of standardizing the re-exposure routine required for solarization so that the results can be predicted

Colour separations form the basis of all three-colour (additive) printing methods and require care in production if accurate colour reproduction is required

Photo-etching A lith or high contrast original can be transferred on to copper or zinc plate which is then etched and used for printing ink images

Contrast control masks is a sophisticated

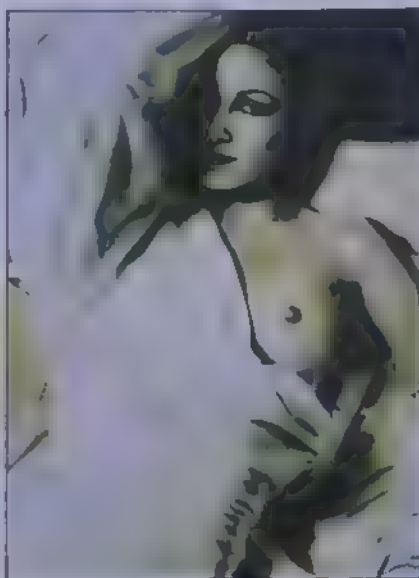
Making calotypes

results are obtained and the process is expensive

Photo silkscreen One of the real craft techniques available a photograph can be converted for screen printing and a number of printings on to paper or fabric

Gum dichromate is a way of making colourful and highly textured art-like prints from large high contrast negatives. In this process you coat the paper of your choice using special coloured emulsion

Airbrushing In the hands of a skilful operator an airbrush can introduce very subtle effects. Its uses also include retouching blemishes and adding non photographic details. It is a technique widely used in commercial work



James Wridge

Colour masking

Dye transfer

separation

Halftone screening

method of photo

production

and publication



Geoff Wray

Carbro prints This technique is cheaper than dye transfer and offers many of its advantages. This pigment process also requires a set of perfect colour separations

Platinum printing is to b & w printing what dye transfer is to colour. It uses the most expensive of ingredients, and requires considerable care in preparation

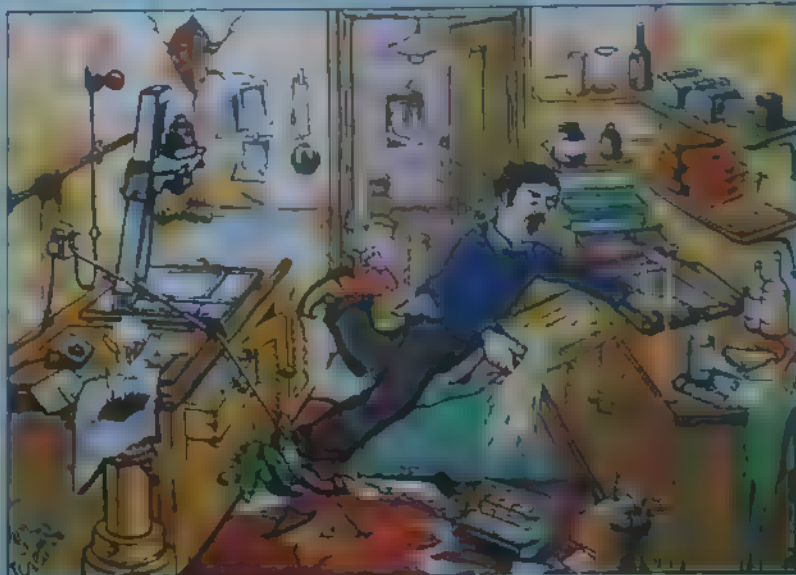
Bromoil is an old-time process which has no modern day counterpart. Its remarkable ability to combine sharpness with texture permits some wonderful pictorial work

Old processes You can get grass-roots experience of photography's early beginnings by duplicating many of the early experiments in producing sensitive material

Darkroom safety

The close proximity of water and electricity is a great hazard even in a temporary darkroom. It is far more so than in a properly designed permanent one. 'Dry' work areas—where you would expect to find the majority of darkroom electricals—must be kept that way, and physically separated from the 'wet' work area. Do not conduct any of the 'wet' operations—such as print processing and washing anywhere within reach of an electrical switch or appliance unless it is designed for use in conjunction with processing. If you have to work in a confined space where there is a risk of breaking this rule, consider fitting a circuit breaker socket to the mains socket you are using. Other safety aspects. Do not use paraffin or gas heaters—and bar type heaters only if they are wall-mounted. Wires should not trail across the floor or any 'wet' work bench. Make sure any pipework and sink arrangement is well clear of the electrical mains supply and power points and switches. Shelving has to be especially well supported. Keep food and drink away from chemicals.

Peter Western



Equipment essentials

Most manufacturers publish specifications and data for their ranges of cameras, lenses and films. Knowing and understanding these can help you to choose the right film and equipment to suit your needs

When you buy a camera, lens or film, you are often faced with a choice of equipment. The manufacturers' specifications and data can help you to choose the right equipment for your needs. Most of the advertisements in photography magazines give specifications for the various products on the market, but unless you are familiar with some of the terms used in these advertisements, they can be confusing. A glossary of some of the terms used in these advertisements could therefore be useful in helping you to find the right equipment.

'Acute matte' screen A coarse surface focusing screen which gives a bright image, but at the cost of detail for fine focusing (see page 1828).

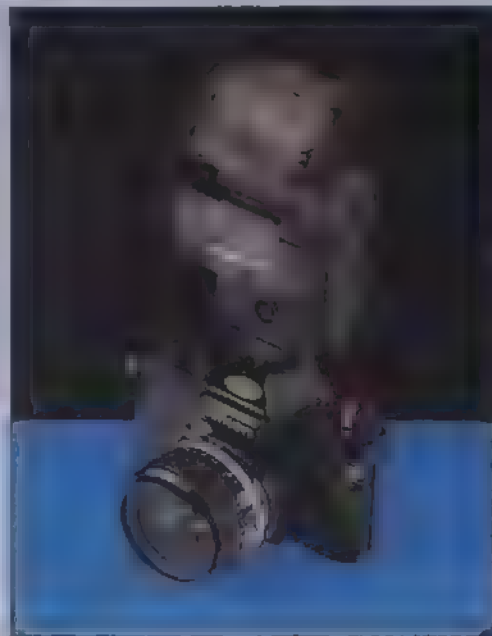
Auto-exposure check (flash) A small indicator which lights up after a test shot to show that there is enough light.

Bright-line viewfinder Non-reflex camera viewfinders are often marked with a bright-line frame etched into one of the elements (see page 1812).

Dedicated flash Designed for specific cameras, dedicated flashguns set the camera to sync speed automatically and make 'flash charged' and other information visible in the viewfinder.

Ergonomic design This is a system of design which allows for comfortable handling and more efficient operation.

Exposure memory device This lets you



Tilt angle Most flashguns now feature this. Some models also allow the flashhead to swivel horizontally.

take a reading from a subject, re-compose and then shoot at the remembered exposure.

Guide number A measure of the power of a flashgun, usually quoted for ISO ASA film (see page 228).

Infrared focusing A particular type of autofocus system (see page 643).

Internal focus A system of lens mechanics in which all focusing is done within the lens. This makes the lens less vulnerable to damage from dust and dirt.

LED metering A type of viewfinder display in which small, usually red and green, give metering information.

Macro focusing zoom Some zoom lenses feature macro facility for close-up work. Strictly speaking, however, these are not genuine macro lenses (see page 60).

'Magic needle' loading A special design of take-up spool for quick and simple loading.

Match needle metering In this system a needle is centred at the side of the viewfinder to give correct exposure.

MTF (modulation transfer function) A method of testing lens performance (see page 1100).

One touch zoom A zoom lens in which a single collar serves as a zoom and a focusing control (see page 60).

Programmed mode Automatic exposure in which the camera selects both the aperture and the shutter speed (see page 203).

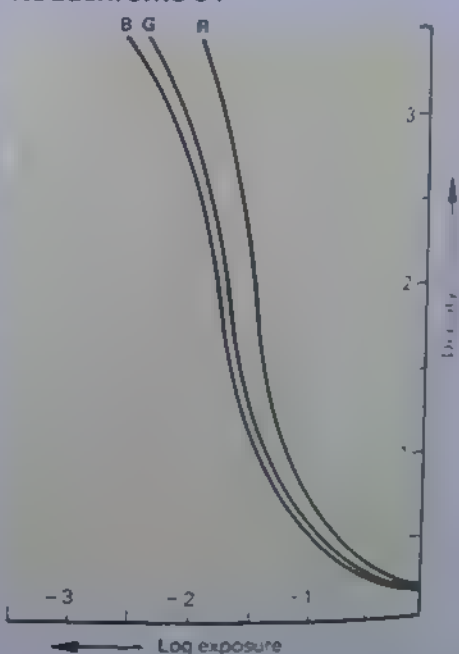
Characteristic curves for a range of popular films

Most manufacturers publish characteristic curves for their films. These curves show the relationship between the log of exposure and the log of density. They are useful for comparing the contrast and speed of different films for a particular application. The curves also show the response of the film to different light sources.

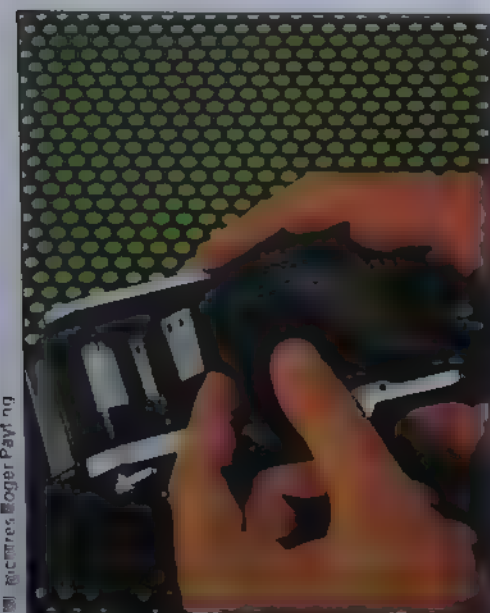
The graphs on the right show characteristic curves for a selection of popular and white colour slide films. Although not intended as a comparison, it is interesting to see a variety of curves.

Different manufacturers give different information about their films. With Ilford B/W film, for example, curves are given for different contrast and one for high speed development time. Curves for Kodak Recording film and Kodak Infrared

Kodachrome 64



Kodachrome 64 Colour slide films have a steep curve and therefore high contrast compared to colour negative film. Notice also how the three curves separate at the shoulder of the curve, indicating that there is a slight colour cast in the shadow areas.



Magic needle Loading film into a camera can be fiddly. This system, however, makes loading quick and simple.

Pulse button exposure control

Slave unit (B&B)

Thyristor circuitry

QT (quick focus) system

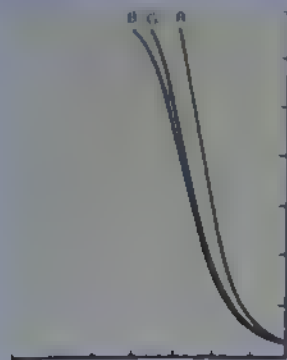
Stop down preview

Tilt angle (flash)

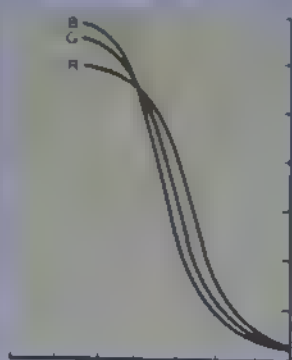
Short travel focal plane shutter

Three way focusing screen

Tri colour exposure guides



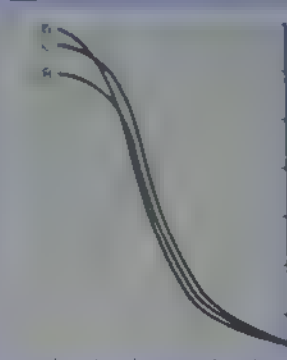
Kodachrome 25 (daylight)



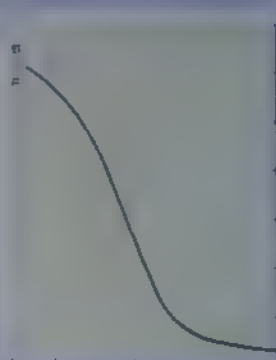
Ektachrome 64 (daylight)



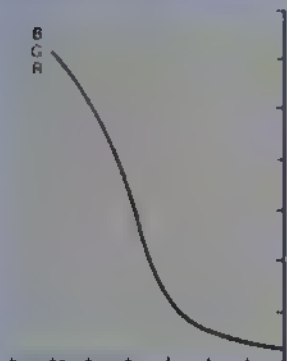
Ektachrome 200 (daylight)



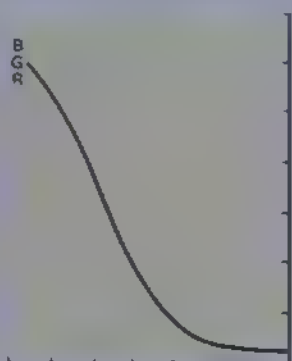
Ektachrome 160 (tungsten)



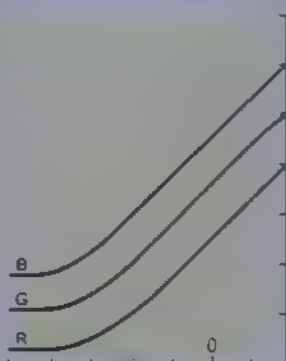
Agfachrome 100 pro



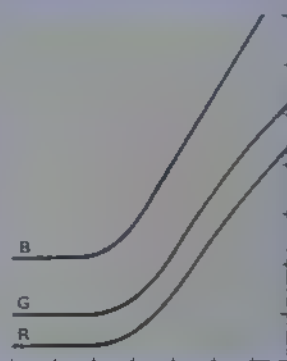
Agfachrome CT18



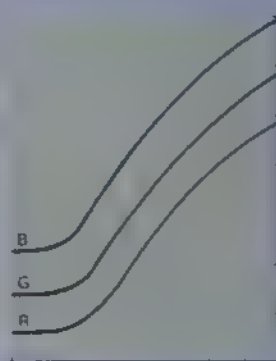
Agfachrome CT21



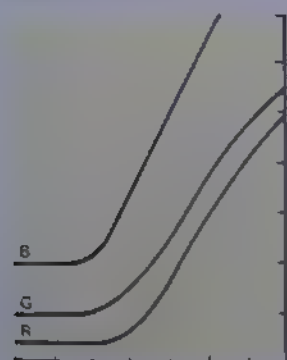
Kodacolor II



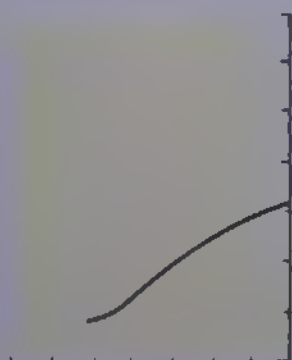
Agfacolor 80 S



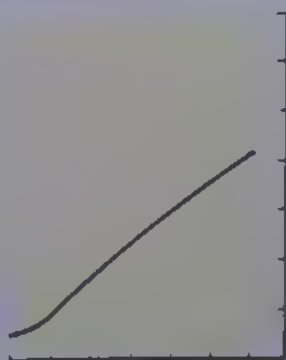
Agfacolor CNS



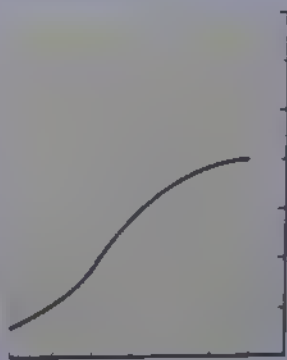
Agfacolor CNS400



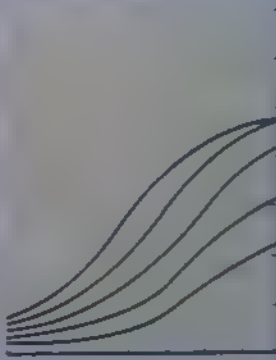
Panatomic-X



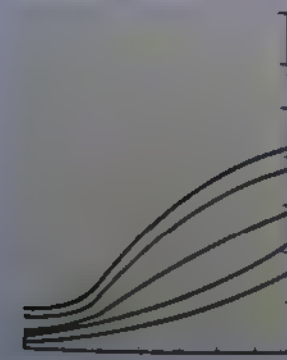
Plus-X pan



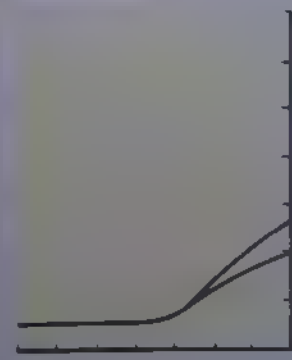
Tri-X pan



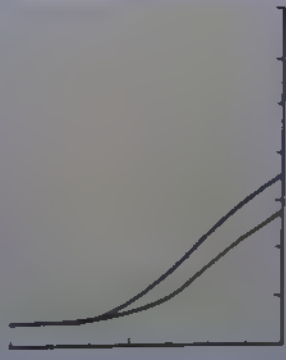
High speed infrared



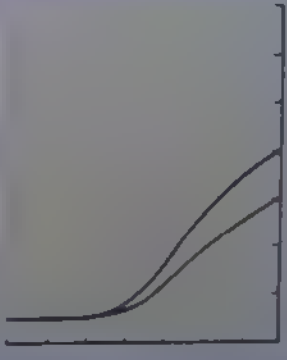
Kodak recording film



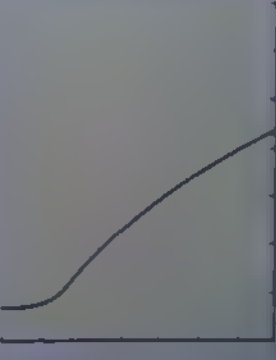
Ilford Pan F



Ilford FP4



Ilford HP5



Ilford XP1



Edgeprint markings

When you are in the future, you may have to refer back to this table to identify the transparency in your collection. If you have an index that lists the name and type of film, you can use it to identify the shot, but if not then you can identify the film by looking at the markings on the top edge.

Most films are easily identifiable as manufacturers generally stamp the name and type of film at regular intervals along the top edge of the strip of film. However, some manufacturers' films are less easily identified—the most notable of these are Kodak's which use a numbered coding system for identification. Each film is classified by a number stamped on to the top edge of the film, generally at about 50 mm intervals.

The table below gives the edgeprint codes for most Kodak films, and if you use Kodak films a lot then these codes could be useful for identification. They could also be useful in actually compiling an index of negatives or slides for future reference. For instance, if you are familiar with the codes then 6017 may be simpler to write in an index than the more lengthy Ektachrome 64 professional (daylight).

	edgeprint code
1 Kodak transparency films, 135 size	
Ektachrome 64 Professional (daylight)*	5017
Ektachrome 64 Amateur (daylight)	5031
Ektachrome 200 Professional (daylight)*	5036
Ektachrome 200 Amateur (daylight)	5076
Ektachrome 200 (daylight)*	5074
Ektachrome 160 Professional (tungsten)*	5037

Ektachrome 160 Amateur (tungsten)
Ektachrome slide duplicating film
Kodachrome 25 (daylight)
Kodachrome 64 (daylight)

(* These films are also available in 120 size. The same as for 135 size except that six replaces the digit of each code. For example, Ektachrome 64 has an edge code of 6017).

2 Kodak colour negative films, 135 size
Kodacolor II
Kodacolor 400

3 Kodak colour negative films, 120 size
Vericolor II Type S
Vericolor II (commercial) Type S
Vericolor II Type L
Kodacolor II
Kodacolor 400

4 Kodak black and white film, 135 size
Panatomic-X
Plus-X Pan
Tri-X Pan
Recording film
High speed infrared

5 Kodak black and white film, 120 size
Panatomic-X
Plus-X Pan
Tri-X Pan
Royal-X Pan

Paper sizes

Format and focal length

Of all camera formats 35 mm is perhaps the most versatile for taking a range of different lenses. Some of the larger formats also take a range of lenses, although usually there is nothing like the versatility available with 35 mm.

The focal length of the standard lens for any format is equal to the diagonal of the format. Consequently the smaller the format the smaller the focal length of the standard lens. Similarly any additional lens will also vary from format to format, as can be seen from the table. Although most of these values are purely theoretical, it is interesting to see how other formats relate to the popular 35 mm format.

Format

Equivalent focal lengths

Disc

1.0

36 mm

6 × 4.5 cm

6 × 6 cm

6 × 7 cm

6 × 9 cm

5 × 4 inch

11 × 8 inch

1.0 × 1.0

1.0 × 1.0

1.0 × 1.0

1.0 × 1.0

1.0 × 1.0

1.0 × 1.0

1.0 × 1.0

1.0 × 1.0

1.0 × 1.0

Format

Equivalent Focal lengths in mm

Format	7	16	24	35	43	54	64	84	105	135	200	300	500
Disc	2	5.2	8	11	14	16	18	24	34	44	65	98	158
1.0	4	8	12	18	22	26	31	41	54	69	102	154	255
6 × 4.5 cm	12	28	42	61	75	87	101	134	181	236	349	534	871
6 × 6 cm	14	32	47	69	85	99	116	154	207	267	395	593	984
6 × 7 cm	15	34	51	75	92	107	126	168	224	289	428	644	1051
6 × 9 cm	18	40	60	88	108	126	149	198	264	339	502	754	1256
5 × 4 inch	27	61	91	133	163	191	224	298	398	512	768	1184	1946
11 × 8 inch	53	121	181	264	325	377	444	594	793	1021	1511	2269	3726

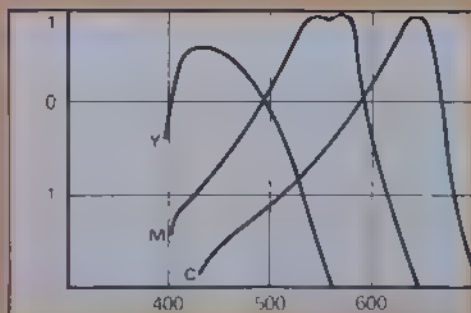
Spectral sensitivity curves

Spectral sensitivity curves for colour films differ from characteristic curves in that they show the sensitivity of each of the three emulsion layers to each wavelength of light in the spectrum. Characteristic curves, on the other hand, only show the response of each of the layers to the total light (see page 196).

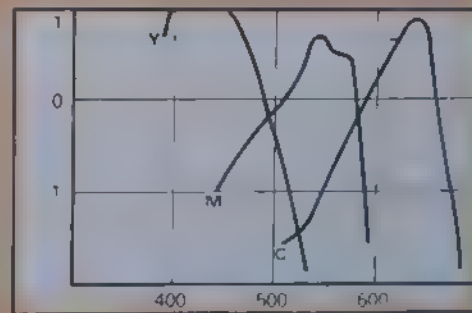
For an ideal colour film each of the three layers would be evenly sensitive to exactly a third of the spectrum. The graph for such a film would consist of three rectangular blocks of equal height and width.

Unfortunately, such a film does not exist and in practice there is an overlap between the three layers. This means, for instance, that the magenta-green sensitive layer is sensitive to a certain amount of blue and red light as well as to green light.

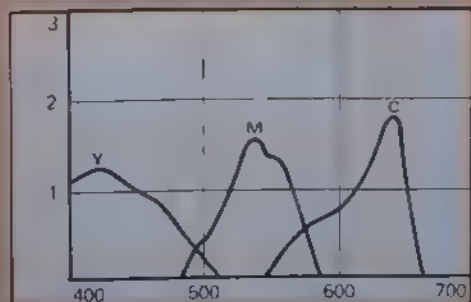
The graphs on the right show the spectral sensitivity of four typical colour films and it is interesting to see how each film appears to have a greater response to one colour than to another. Kodacolor II, for instance, has a perceptibly greater sensitivity to blue light than to green and red light.



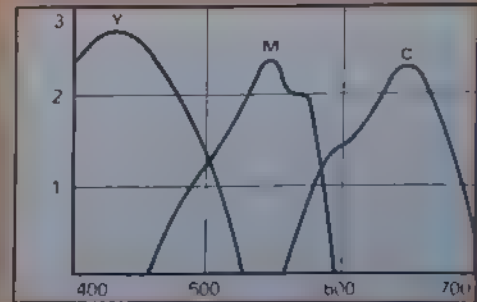
Ektachrome 200 (daylight)



Kodacolor II



Agfachrome CT18



Agfacolor CNS

The creative approach

The essence of creative photography is hard to pin down, but for images to be both interesting and appealing, the importance of basics such as lighting, composition and viewpoint should never be overlooked



© Stephen Thomas/Photo Bank

The creative approach to photography is a way of thinking that is not limited by the technical aspects of the medium. It is a way of seeing the world that is both imaginative and practical. It is a way of capturing the essence of a subject that is both interesting and appealing.

Both the creative and the technical aspects of photography are important. Creativity extends to the way of treating the subject, and the technical aspects are a development of the creative approach. The creative approach is always there, and it is always the most important. The creative approach means capturing the essence of a subject that is particularly interesting and appealing.

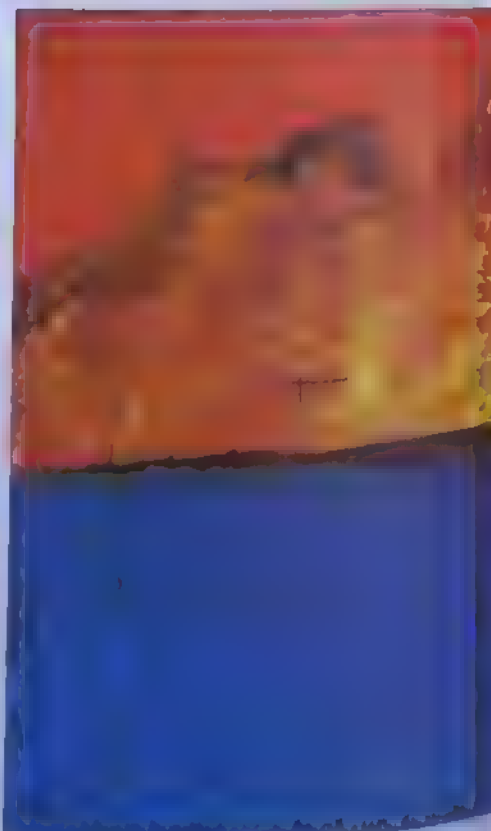
Creative Approach articles have looked at a wide range of different subjects, probing new ways of seeing them in a photograph. But when you are with a subject, you need an instant solution to the problem of photographing

it. This is the creative approach. It is a way of seeing the world that is both imaginative and practical. It is a way of capturing the essence of a subject that is both interesting and appealing.

Composition

The creative approach to photography is a way of thinking that is not limited by the technical aspects of the medium. It is a way of seeing the world that is both imaginative and practical. It is a way of capturing the essence of a subject that is both interesting and appealing.

The creative approach to photography is a way of thinking that is not limited by the technical aspects of the medium. It is a way of seeing the world that is both imaginative and practical. It is a way of capturing the essence of a subject that is both interesting and appealing. It is a way of seeing the world that is both imaginative and practical. It is a way of capturing the essence of a subject that is both interesting and appealing.



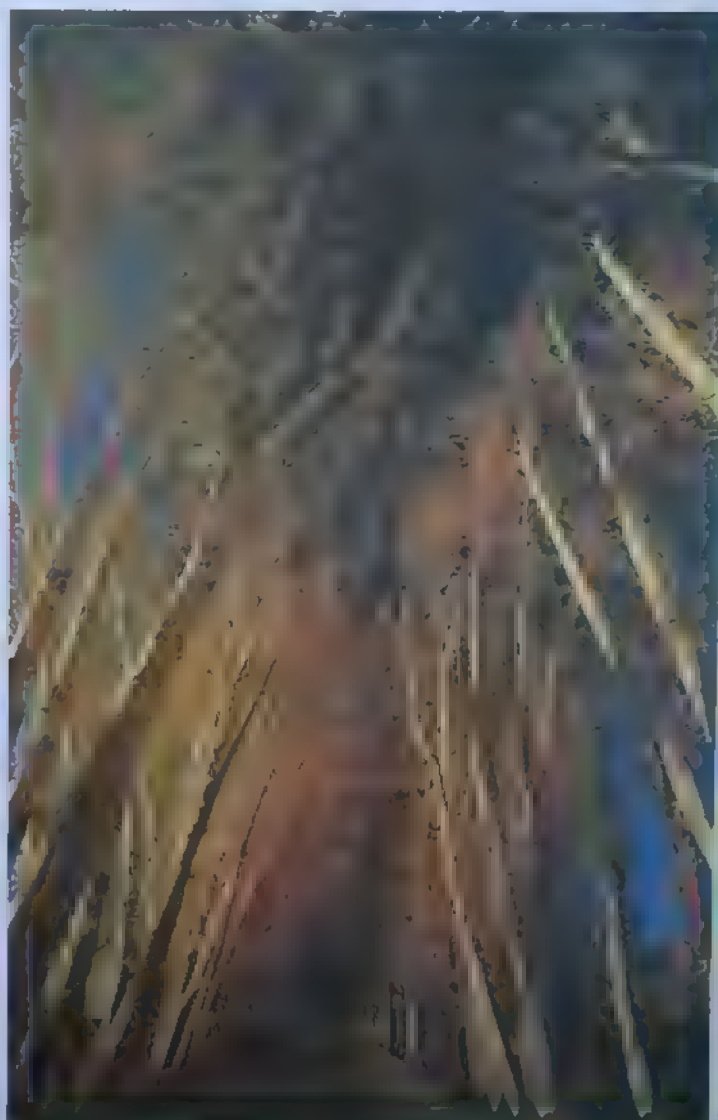


Choice of viewpoint

Golf ball Low viewpoint, a wide angle lens and careful planning to align the sun directly behind the golf ball, produced a striking photograph one that is novel without relying on gimmicks. **Young couple** A special effect need not be simply a lens attachment—here the photographer used a flashgun outdoors with a slow shutter speed to hold the colour of the sky. But it is the choice of subject and the general treatment, rather than the use of special effects, that make shots like this work. **Blue wheat** Mitchell Funk is well known for his use of filters, multiple exposures and other 'tricks' but he is careful to ensure that the subject is interesting in itself and complements the technique. **Trees** Pointing a wide angle lens upwards emphasizes the towering grace of this tree-lined avenue—but the viewpoint is crucial.



Mitchell Funk © David Porter 1999



David Porter

Painted boat -
The boat was painted
in bright colors.
The children were very
pleased with it.

Railway siding -
The train stopped at the
siding for a moment.

The children were
very happy to see
the train.

During the first day
and night of the
picture week the
young people were
very busy and the
attractive objects



Javan schoolchildren *Where the background contributes little, close in on the subject for a strong, simple image*

the picture will be a random selection from all the pictures you have taken. You might just get a good picture—but the technique is rather similar to that of artists who produce abstracts by riding bikes over the canvas. On the other hand, since beauty is in the eye of the beholder, you might just find that both you and your audience appreciate your approach. There can be no fixed rules about what is good and what is bad—it all depends on what people want at any particular time.

If your choice of viewpoint is inspired by your imagination, however, there is a greater chance that you will be able to develop the approach into your own personal style of photography.

Choice of lens

Composition, viewpoint and lens choice often go together, but it is evident that many photographers regard certain lenses as 'creative' to the almost total exclusion of others. In particular, a





Snapper Backlighting and the use of a long lens creates a bold silhouette contrasted with the glistening surf

taken using standard lenses as much as using the all-seeing wide angle or the prying telephoto.

Nevertheless, the non-standard focal lengths are very popular for some forms of creative photography—pictorial work especially, though less so for documentary and reportage, for which moderate wide angles are favoured. The more extreme wide angles, though they have a field of view about as wide as the eye, compress this into the frame so that we see everything at once—they are good for showing the relationship between different elements in a scene by bringing them closer together, giving an original view of the world. Imagine, for example, a brown ploughed field and a blue sky—the wide angle will tend to reduce these to blocks of colour, whereas a standard or telephoto lens will show details of the field which could distract the eye.

On the other hand, the telephoto tends to allow you to pick out individual details



in the scene, emphasizing them. Your photographer's eye must work in a different way when seeing telephoto pictures—you must often make more decisions about what to leave in and what to cut out, which is where much of the creativity of using such lenses lies.

Lighting

Very many good photographs of otherwise ordinary subjects are interesting simply because the lighting was right. There are many possibilities—hard and contrasty for punchy shots, soft for romantic or nostalgic pictures, or backlit shots. The lighting must complement the subject, so if you have any control over it you can emphasize any particular feature you want. Even in the case of a landscape you can choose the lighting by waiting or even returning some other time, or simply by moving around so that the light comes from another direction.

In many cases you have to use your imagination to show you how a particular shot could look if only the lighting was different. Even in the case of a still life, where all the lighting is controllable, it helps to have some idea of what you want to achieve—and this is best done by picturing an effect in your mind, then working out how to achieve it.

Lighting can sometimes be altered to suit your personal taste. Some movie directors are well known for their characteristic lighting, but still photographers, too, have their own approach to the use of light. This does not mean, however, that you always take pictures at sunset or you always use moody lighting

***Glider** Choice of lighting is crucial in creative photography—here light alone made the shot full of atmosphere*

when taking a portrait. It can be as subtle as careful use of shadow to show form, or a tendency to prefer warm lighting. But take care not to use your favourite trick at every opportunity—you will simply end up with a set of similar looking pictures.

Technical tricks

A good many photographers rely on technical means to achieve creative results. This approach can range from using grainy film, through effects filters to montage or combination printing. In fact every photograph is a technical trick of some kind—you are using a technical medium, and as Marshall McLuhan put it, 'the medium is the message'. In other words, by taking a photograph of something rather than writing a poem or embroidering a tapestry you are approaching it from a certain point of view. By representing motion by giving a slow shutter speed and allowing the subject to blur you are using a simple photographic trick which is the opposite end of the spectrum from fisheye lenses and multiple image filters.

This is probably the most versatile way of introducing creativity, but at the same time it is definitely the least highly regarded. This is probably because anyone can put a prism over their lens and call it art, but only in a small proportion of such cases does the prism really add anything worthwhile. Often this is because the effects produced are

so unsubtle that the photograph is more a picture of the effects than of the subject. The secret is to previsualize each shot with a particular effect, to explore in your mind which effect, if any, will complement the picture. That way you will save time and film, and also become used to looking at the world in terms of the effects so that when a genuine opportunity to use one arises, you will be able to choose the right one.

Imagination

The most important ability that the creative photographer can have is imagination. You should be able to see what the picture will look like before you even raise the camera. In this way, you can decide how to make changes which will influence the mood and emotional content of the shot, using all the aspects of creativity at your disposal.

Imagination is a faculty that can be developed by practice as much as all your technical skills. And there is more to it than simply seeing a picture in your mind's eye—you should be able to 'think laterally' and come up with original approaches. Some people find this much easier than others, inevitably, otherwise everyone would be a brilliant photographer.

You may not achieve the same success rate as an expert and acknowledged photographer, but by constantly striving for creativity your work should show worthwhile results. Set yourself challenges, and above all take pictures. In photography, as in so many other fields, practice makes perfect.

What went wrong?

JUDGING PICTURES OF PEOPLE

Every photographer is tempted to take candid shots of people from time to time. But, as our judges found with this selection, simply catching your subject unawares is not enough to make a good picture



A



B



C



D



E

The Photographers' Choice

Colin Molyneux	DAEBC
Ian McKinnell	DEACB
Homer Sykes	CEDBA
John Sims	CDBEA

None of the members of the panel were impressed by these photographs of people, taken as a group. Each, however, had a favourite and this led to an interesting comparison of analyses.

There was a clear division of opinion over the choice for first place, with Homer Sykes and John Sims putting C first while both Ian McKinnell and Colin Molyneux were unimpressed by C and instead chose D. Homer Sykes said of C 'the photographer has produced a picture that very clearly tells a story. The

mountains, the very tired father and the well-worn walking boots all go to say one thing. A little bit of humour has been added, with the larger-than-life hat being the first thing to grab your attention'. John Sims also liked what he called 'the wry sense of humour'.

It is clear that the gentle approach of C which impressed Sykes and Sims merely seemed dull to Molyneux and McKinnell who put C last and second last respectively. Instead they liked the 'dynamic feel' of D. McKinnell complimented 'the restlessness imparted by the shape the man makes and also through the other elements—the diagonal yellow lines and the thrusting shape of the parking sign'. They also both drew attention to the

paradoxical impact of the photograph, with the policeman's pose and other elements giving a feeling of energy while the floppy hat dissipates the tension with its lazy relaxation.

'People' pictures can clearly be approached from different angles. What seems gentle and harmonious to one photographer can be labelled 'lacking in dynamism' by another. Our panel spontaneously split up into two pairs, each judging by different criteria.

Whatever their criteria, however, all our judges tacitly agreed on two things—photos A, B and E were all too uninteresting to be worth commenting on, and technical shortcomings—particularly underexposure—still wasted potential.

